RAILROAD GAZETTE

SATURDAY, JUNE 7, 1873.

CIVIL ENGINEERS' CLUB OF THE NORTHWEST.

The Relation of Engineering to Architecture.

[A paper read before the Civil Engineers' Club of the Nor hwest May 12, 1873, by W. L. B. Jenney.]

GENTLEMEN: The subject I have chosen, the Application of Architecture to Engineering, is interesting alike to the two professions that, although so intimately related, have in their practice only too long labored independently, to the injury of both. There is, however, an earnest endeavor on the part of many eminent men, particularly in England, to create a spirit of good fellowship and mutual assistance that is soon destined to bear rich fruit, healthful alike to the future architectural and engineering constructions.

The best definition of architecture is perhaps that of Fergusson, "It is the art of ornamental and ornamented construction." By ornamental construction is meant the arrangement of the several parts—the solids and the openings, the sky line and the general composition—devoid of details, so that it shall make an artistic effect. This is the appearance a building would have if seen at a distance just sufficient to lose the details, and is in fact the preliminary study of the architect. By ornamented construction is meant the details of decoration applied to constructive features, such as the molding of a dripcourse, the chamfering of an angle, the carvings on a capital, or the ornamenting of the bracket of a cornice. It is the opposite of constructed ornament, which is always bad and is not architecture; and, if it deserves any name in the arts, it is simply that of decoration, unmeaning and misapplied.

Although a well-composed construction, of whatsoever kind, will always make a fine appearance, even if absolutely free from any attempt at detailed ornamentation, still no amount of decoration, however elegant in itself, will entirely redeem a poor composition.

Engineering, or that branch of it under our special consideration, is the science of the general fitness of construction to the use intended; it is the proportioning of all the parts to the work they may be called upon to perform. Its motto is *stability* and *economy*.

The strain on each part is carefully calculated and judicious co-efficients of safety are applied throughout the entire construction; and if a pier, or truss, or arch will best do the work intended, with a proper allowance for accidental defects, and if the material is disposed economically, then it is good engineering; while to be good architecture, more is required: there should also be an apparent evidence of safety, for an inadequate appearance of support is as detrimental to repose in design, esthetically, as actual insufficiency is to the statical structure.

The architect who is called upon to erect an edifice, even if of no more importance than one of our city hotels or business blocks, must be an engineer as well as architect, or he must have the assistance of one skilled in construction and capable of applying the principles of engineering to the strength of materials; otherwise he renders himself justly liable to criticism and the annoyance of having the lower portions of the building crush under the weight of the upper stories, even before the work is off his hands. The engineer is more fortunate—he can do a good piece of work that shall satisfy all the demands to a high degree, without any architectural assistance, so long as he makes no effort whatsoever at any esthetic effects; but when he feels that the position or importance of his work requires that it should make an artistic appearance, then he needs the assistance of the architect. As civilization advances and the works of the engineer and architect become more and more important, the necessity increases that the two professions should go hand in hand, each assisting the other, and jointly striving for the good, the true and the beautiful, as the summit of all excellence.

It is a common remark by English writers on architecture, that their engineers always fail, when they make an effort for anything more than stability and fitness actually demand, and usually cover their work with an unmeaning screen of classical columns and entablatures with no work to perform; costly and without purpose, and therefore bad. It is no more architecture than a pill-box is the science of medicine.

It is certainly curious and difficult of explanation that the engineer, who is always so careful of the fitness of his own proper work to the object in view, almost always uses architecture solely to hide that which, simply because it is true to the purpose, is always far better than the worthless screen he plasters on to it.

In the best periods of architecture the constructions were designed to be the most suitable and convenient for the purpose intended, and the several parts arranged to produce the most stately and ornamental effect consistent with use; ornamenting the constructive details with harmonious and appropriate design, taking care that their ornamentation should be the most artistic they were capable of inventing.

Such buildings, by whomsoever erected, either by the Egyptians, the Greeks, the Romans or the Gothic architects, or even by the half-civilized tribes, are ever interesting, independent of fashion, style, epoch or nationality. They are true architecture, and whether erected in the fifth, thirteenth or nineteenth centuries, are admired by all those who possess true and cultivated taste.

The same principles that govern the engineer in the designing of the purely utilitarian portion of his works should also guide him in the design of any ornamental or ornamented portions he may think best to add.

There is a short lesson, hard enough however to learn, that tasteful simplicity is always elegance, that applies well to the addition of architecture to engineering works.

It is a mistake to cover a bridge pier or tunnel entrance with delicate carving like a church portal; but whatever ornament is used, however simple or severe its character, it should be as artistic in its design as if it were to decorate an art museum.

Inasmuch as there are many styles of architecture that have risen and flourished in different countries and at different epochs, it may naturally be asked, which is the best adapted to engineering works?

Each nation, at each period, has had its own special style, brought to more or less perfection by a whole nation of architects, all working in the same direction, striving for the same end, viz., artistic and constructive excellence.

In their permanent conquests they carried their national architecture with them, and grafted it on to the style of the conquered, if they had so far advanced in the art of building as to possess one.

Extensive emigrations in later times took the place of conquests, the emigrants taking their style with them, to be reproduced, in their new homes, in public and private buildings.

To-day England, France, Germany, Switzerland and Italy have each their styles to a greater or less extent, in a more or less pure or transition state; but America, composed as it is of a population derived from all civilized nations, is not only without a style of its own, but has mixed all the styles of all epochs into one heterogeneous mass, that will require not only years but an increased artistic education of the people to enable us to concentrate our labors so as to either form a style of our own, or to universally adapt that of another country to our wants.

No one or two minds, however talented, can unassisted invent a new style or successfully work out of an old one, invented by another people, at another period, for other wants, a style adapted to the requirements of the day. This can only be done by a whole nation of architects, with fixed purposes and concentrated studies and practice.

The ablest architect can at best but take his place as first among his peers. His practice can be but the exponent of his studies, his time and his people. He can no more unaided invent a new style than he could invent a new science. He must take his art where he finds it and contribute toward elevating it to a more artistic excellence, to one better adapted to the climate and the habits and requirements of the people.

Naturally he finds the architecture that approaches nearest to his purpose among a people with habits and in a climate nearest resembling that of his own people and his own country.

The architecture of the North should not be that of the South; Chicago should not look to Constantinople for its types. The gilded dome, so resplendent with beauty under a vertical sun, is sadly out of place in a snow-storm. One of our street fronts, cut away for light until the plate glass forms the half of the facade, would be intolerable in the hot countries of India.

The climate of Chicago and that of the North and Northwestern States is nearly allied to that of England. The habits, the language, the requirements and the institutions of the people are much the same: it is then to England we should look for the type of architecture to serve us as a starting point for our own practice.

Here we are so fortunate as to find a style that, after forty years of hard labor on the part of their most talented architects, has been worked up from a style that originated either among their own or a kindred people, that is well adapted to a cold, moist climate, and that, after these long years of study and modification, has reached a perfection that entitles it to all the honors of a new style.

It might be called, for want of a better name, Modern English Gothic.

It first grew into public notice in 1832, when the designs of Sir Charles Barry were adopted for the Houses of Parliament, which gave rise to much discussion, resulting to the benefit of the Gothic. As other competitions took place—like the one for the Great Law Courts, when a Gothic design was chosen; the Town Hall of Manchester, again a Gothic design; the Town Hall of Bradford, the College of Wales, etc., all Gothic—the style advanced until at length it came to be acknowledged as the style best adapted to the habits of the people and the climate, and—what is of equal importance, especially to the engineer—to be exceedingly economical, and so flexible as to be readily adapted to any requirements.

There is no style that the engineer can use so readily, or with so little additional cost, as the Gothic. It can be as plain and massive as he may desire, while it is capable of any amount of elaboration and delicate carving.

A factory, with its engine-house and tall chimney, can be made monumental without an extra dollar being added beyond what is necessary to secure good and substantial work.

A suspension bridge, with its towers and the graceful lines of the cables and road-bed, can be made to possess great artistic excellence.

In short, any engineering structure can, by a tasteful composition and artistic proportioning of its parts, without a single addition of sculpture or costly detailing, be made to assume a fine appearance, that will, as long as it stands, elicit the admiration of every one possessing a true knowledge of art.

It has been said that Gothic architecture is a relic of barbarism. Were those fine old cathedrals of Amiens, Chartres, Beauvais, Rheims, Rouen, Canterbury, Lincoln, Westminster Abbey, and a host of others, built by barbarians?

Ancient Gothic architecture reached its climax in the thirteenth century, when every workman was an artist and everything they did was artistic; the houses they lived in, the clothes they wore, their jewelry, furniture and household utensils were all artistic. The sculpture throughout the old cathedrals, consisting of legends from the Bible, implements of husbandry, the history of the times, etc., calls forth unqualified admiration.

The worshipers that entered those glorious old edifices and walked up the nave under those vaulted ceilings (that are to-day marvels of engineering skill) until they reached the eastern end, kneeled on the mosaic pavement before the altar. The light streaming through those gorgeously painted chancel windows, like unto which no man living can execute, fell on Christians, speaking the language and worshiping the God of our ancestors. They were earnest, painstaking men, and their works display an amount of thought, and a knowledge of constructive art, that excite one's wonder and admiration.

Look at the roof vaultings with the thrust taken by a line of stone, or flying buttress, so delicate that were it not that the direction of the force is always within the material they would not stand a moment, showing a knowledge of the stability of arches so exact as to pass our comprehension. Look at the methods employed to avoid injury by unequal settling, and the corbeling out at the angles to pass from the square to the dome, and many such ingenious devices in construction, each displaying a knowledge of which an engineer of our day might be proud.

Respect for ourselves forbids that we should call these old cathedral builders barbarians.

The classic styles were invented in Southeastern Europe, among the Latin and Greek races, for the use of the temple, with its one room lighted from above illuminating a gigantic idol. Here were held the secret ceremonies of the priesthood. Without was a grand colonnade for the processions, to be viewed by the multitude.

The classic styles are certainly a relic of paganism, and if we are to judge of the relative merits of the two styles from this point of view we may safely accord the palm to the Gothic.

It may naturally be asked, How is an engineer, with the limited amount of time that can be devoted to study, to acquire a sufficient knowledge of Gothic architecture to serve his purpose, upon such works as are not of sufficient importance in an artistic point of view to warrant the employment of professional architectural assistance?

This question is not easily answered. There are a great number of works, photographs and illustrated volumes, descriptive of the finest Gothic work of that great epoch from the twelfth to the fourteenth century, but these works, however valuable to the architect, are not what are wanted by the engineer. They are the starting point for the study of Gothic architecture, that has required the united efforts, during forty years, of many talented men to bring it to the perfection in which we find it to-day. Inasmuch as it is constantly advancing, it is in the English architectural periodicals of the past ten years that we find what is of most use in practice.

It is certainly worth any man's time to read Eastlake's "Revivals of Gothic Architecture," but for examples that will be of direct professional assistance to the engineer, I think that the most will be found in a weekly publication called the *Building News and Engineering Journal*, published in London. This journal contains weekly some 12 to 14 pages of reading matter, a part of which is always interesting, together with four to six pages of well-executed photo-lithographic illustrations of proposed works, ranging through all departments of architecture.

There is another periodical, the *Builder*, which I find decidedly worth the cost; but I would give preference to the *Building News*.

In conclusion, I would respectfully but earnestly advise every constructive engineer to devote all the time he could spare to the study of modern Gothic, in its simplest forms; for a knowledge of art begets a desire for it, and by creating a want we sooner or later produce a supply. The greatest drawback influencing architecture in the United States is the want of art schools. If we could only educate the public, all that we desire would follow.

Memorandum Concerning Iron Rails.

[Furnished to the Civil Engineers' Club of the Northwest, May 12, 1873, by L. P. Morehouse.]

It is well known that the last winter was remarkably severe in its effects upon the track of railroads, and this statement is offered for the purpose of placing upon record some information as to the amount of wear upon iron rails during the winter.

Out of 18,945 rails examined in October, 1872, and found in good condition, 32 per cent. failed before the 1st of April, 1873.

Many of these rails were nearly new, 4,657 having been laid from four to ten months only.

Of these, 21 per cent. failed; 3,197 were on straight track, 1,080 were on curves of less than four degrees, and 380 were on a curve of six degrees.

Maximum grades on this portion of road are 42 feet per mile, and the wear upon track is about 2,500,000 tons per mile yearly, moved at 15 miles per hour.

Mr. Price Williams gives the life of good iron rails on English roads at 15,000,000 tons of "moderately fast traffic." Accepting this as a fair statement, we must conclude either that the conditions of service on American roads are widely different from those abroad, or that the quality of the iron rails used in this country is greatly inferior to that of rails on foreign roads.

For the winter season, at least, our roads are in worse condition than English roads, and a true principle of economy would therefore seem to require rails of a better quality for this country than those in use abroad.

In stating that the rails *failed*, I do not mean that all of them had to be taken from the track, but that they showed evident signs of wearing out, being more or less battered.

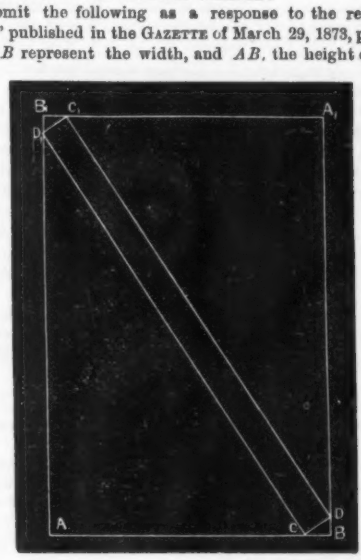
Contributions.

To Find Length of Brace of Howe-Truss Bridge.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I submit the following as a response to the request of "F. P.," published in the GAZETTE of March 29, 1873, page 127.

Let AB represent the width, and AB, the height of a *panel*; and let BCD represent the *angle block*. Then will CD, represent the length and CD the width of the *brace*.



Put $AB, = a$, $AB = b$, $CD = c$, $CD, = x$, and angle $BCD =$ angle $AD, C = p$.

Then is

$$x \sin p = AC$$
$$c \cos p = CB$$
$$\therefore \quad x \sin p + c \cos p = b \qquad (1)$$
$$x \cos p = AD,$$
$$c \sin p = D,B,$$
$$\therefore \quad x \cos p + c \sin p = a \qquad (2)$$

From (1) we get:

$$x = \frac{b}{\sin p} - c \cdot \frac{\cos n}{\sin p} \qquad (3)$$

From (2) we get:

$$x = \frac{a}{\cos p} - c \cdot \frac{\sin p}{\cos p} \qquad (4)$$

Equating (3) and (4), and multiplying both sides by $\sin p \cos p$, we get:

$$b \cos p - a \sin p = c\,(\cos^2 p - \sin^2 p) \qquad (5)$$

But

$$\cos^2 p - \sin^2 p = \cos 2p$$

By substituting this value for $\cos^2 p - \sin^2 p$ in (5), we get:

$$b \cos p - a \sin p = c \cos 2p \qquad (6)$$

And, from (4), we get:

$$x = \frac{a - c \sin p}{\cos p} \qquad (7)$$

If c is a common divisor of a and b, equation (6) will take a more convenient form by dividing it by c. In that case we shall have:

$$b, \cos p - a, \sin p = \cos 2p \qquad (6,)$$

As an example of the use of these formulæ, assume $a = 15$ feet, $b = 10$ feet, and $c = 1\frac{1}{4}$ feet or 15 inches. Then, because c is a common divisor of a and b, we have:

$$b, = 8$$

and

$$a, = 12$$

and formula (6,) becomes:

$$8 \cos p - 12 \sin p = \cos 2p$$

By a few trials, substituting these values from a *traverse table*, we find that the value of p is between 31¼° and 32°. Assume

$p = 31\frac{1}{4}°$ and substitute from a table of *natural sines*, and equation (6,) becomes:

.488248 = .446198; error, .042050

Assume $p = 32°$:

.425356 = .438371; error, .013015

Because the left-hand member of the equation is too *large* in the *first* of the above assumptions, and too small in the *second*, it follows that the value of p is *more* than $31\frac{1}{4}°$ degrees, and *less* than 32°. And, moreover, because the *sum* of the *errors*, or .065065, is the result of a variation of 15′ in the angle p therefore the error, .013015, will require for its correction a variation of a little more than 3′, and, consequently, the true value of p is a little less than 31° 57′. Substituting this value for p in (7), we find:

$$x = 16.897 \text{ feet}$$

and, by an easy calculation, we may prove that this value of x is correct to the nearest unit of the third decimal.

If we desire to determine the length of the brace by *calculation*, the method here developed would seem to offer greater facility than that given at page 155 (GAZETTE of April 19). If, however, the engineer should prefer to determine the length of the brace by the use of the *scale and dividers* alone, then the "Practical Geometrical Method of Loci," as explained by Professor Mahan, at page 217, Vol. I., *Mathematical Monthly*, will greatly facilitate his labor.

J. E. HENDRICKS.

DES MOINES, Iowa, May 22, 1873.

Hudson's Improvement in Locomotives.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the RAILROAD GAZETTE of last week I observed your illustration and description of the above improvement.

Having a strong predilection to the mechanical art, and having made some little proficiency, I hail with pleasure any new development which promises increased efficiency; hence you can scarcely imagine with what delightful expectancy I turned to a computation of the advantages gained by Mr. Hudson's improvement. But strange to say, I failed to discover anything but a positive loss. However, knowing the h gh reputation of Mr. Hudson and his eminent practical and scientific attainments, I ascribed the above result to my own opacity, and with the view of having my analysis corrected, I applied to some of my brother craftsmen. However, strange to say, their estimate simply confirmed my own; they remarking at the same time that "If Mr. Hudson makes one of his patent engines, he will never produce a second." Now, as it would be manifestly unjust to Mr. Hudson to condemn his *improvement* by designating it a *misnomer*, without his having an opportunity to elucidate the mode of action in such way as to demonstrate that it is what it professes to be (viz., an improvement), I trust, therefore, through the medium of your valuable journal, Mr. Hudson will enlighten his less-gifted brethren with such demonstrative proof of his improvement as will entirely banish their skepticism, and so remove all impediments in the rapid introduction of his new scheme, and confer a favor not only on the engineering fraternity, but also on one who is

RATHER MECHANICAL.

New York, May 28, 1873.

P. S.—Doubtless Mr. Hudson is aware there is *nothing new* in superheating steam in locomotives, and of the several modes of doing so that have been practiced for over twenty-five years.

R. M.

Report of the Connecticut Railroad Commissioners.

The following is the chief part of the twentieth annual report of the General Railroad Commissioners of Connecticut, introducing the statistics and reports of the railroads of the State for the year ending September 30, 1873:

To the Honorable the General Assembly of the State of Connecticut: May Session, 1873.

The Railroad Commissioners herewith respectfully submit their twentieth annual report:

The reports of the several railroad companies for the present year are made in accordance with the amended law passed last session of the Legislature. This law fixed the thirtieth of September as the date upon which the annual report of all companies should close. The late date at which the law was passed, and the short time remaining before the close of the year to be reported, made some difficulty in collecting the returns for this year.

Another embarrassment arose from the fact that some companies had, in previous years, made up their returns to the 31st of December. Such companies then had but nine months, from the close of the year already reported by them, to the close as now required by law, upon which to report operations. The Commissioners, considering that the present statute is a new law, with a form different in many respects, required all companies to present full reports, for one year, ending September 30, in strict compliance with the provisions of the statute. Some companies, therefore, in presenting these returns for a full year, necessarily have included three months already reported last year under the old form. Where records of the exact items required in the new schedule had not been kept, they are estimated as nearly as practicable, so that the returns for the year may be complete. These difficulties, pertaining to the adoption of a new form, will not occur again. The fact that a part of the year's operations has been before reported, and is now again included, does not alter the value of this report as showing the result of operations for one year.

Returns are herewith given from twenty-two corporations, having their road wholly or partly in this State, representing in all 1,268 miles of road. Of this length, 105 miles are yet unfinished, leaving 1,163 miles in operation, of which 868 miles are within this State. This gives an average of one mile of finished road to every 5 33-100 square miles of territory, and to every 620 inhabitants in the State. Since rendering the last report, the Boston, Hartford & Erie has commenced operating about 25 additional miles between Putnam and Willimantic, and the Danbury & Norwalk has completed a connection with the Shopaug Valley about six miles in length.

The whole capital stock reported is $44,344,550, and the paid-in capital $35,460,117.66. Increase of paid-in capital since the last report, $4,468,673.40. About 35 per cent. of the capital stock issued is owned or held in this State, and about 44 per cent. of the capital paid in. The number of stockholders within this State is 4,005, giving an average held by each stockholder of $3,942.98.

The amount of the funded and floating debt is $43,273,492 85, an increase since the last report of $24,412,442.16. This increase is mostly accounted for by the funded debt of the Boston, Hartford & Erie corporation, which is included in this amount, and was not last year reported. The amount of this funded debt is also included in the total "cost of road and equipment," and represents the cost of that road to the bondholders, by whose trustees the report for the company is made. The whole cost of roads and their equipment is $74,074,037.40. In round numbers the total cost or permanent investment is $74,000,000, of which $31,000,000, or about 42 per cent., is paid for, leaving an indebtedness of $42,000,900, or about 58 per cent. of the whole.

The average cost of the road and equipment per mile is $58,464.12; the highest being the New Haven, Middletown & Willimantic, which, though but a single-track road, cost $106,401 per mile, and the next highest the New York, New Haven & Hartford, which cost $105,393.95 for a double-track road.

The total amount given as "cost of road and equipment" is manifestly incorrect, and should be greater, since the cost of road given by the New London Northern and by the Shore Line represents the cost of their stock and bonds to the present companies, which became owners of their respective roads by foreclosure of mortgage. In the same manner the cost per mile for the construction and equipment of these two named roads should doubtless be greater than represented in the table, as the amount there given represents only the actual cost to the present company. The lowest actual cost per mile for construction and equipment is in the case of the Shepaug Valley, which cost $25,417.32 per mile.

The report shows a large addition to the rolling stock for the year. The number of locomotives has increased from 243 to 277; passenger cars from 311 to 335, and merchandise cars from 4,041 to 4,705.

The number of men employed by the companies represented, exclusive of any engaged in construction, is 6,506, which furnishes an average per mile for the miles now in operation of 6 4-10.

The total mileage amounts to 5,679,594 miles for all trains, being 585,312 miles more than last year. The number of passengers carried in the cars is 10,134,633, an increase of 625,814; tons of merchandise transported, 3,162,473; increase, 440,242 tons.

The total cost of operating all the roads is $7,489,521, which amount is about 66 per cent. of the gross earnings. Of this amount about 28 per cent. is for "maintenance of way;" 29 per cent. for "maintenance of motive power and cars," and 43 per cent. for "miscellaneous" expenditures. The average cost per mile of road for operating is $6,434.29. This varies from $18,000 on the New York, New Haven & Hartford, to $500 on the Shepaug Valley. But since this cost is increased or diminished in proportion to the number of trains and the business done upon the road, the cost proportioned to each mile in length furnishes no reliable information. The cost per train mile run averages $1.31, being precisely the same average cost as that given by the Railroad Commissioners of Massachusetts, in their report of the same year's operations. The highest is $1.53 on the New York, New Haven & Hartford, and the lowest 53 cents, on the Shepaug Valley. Of this average cost of $1.31 per mile run, 36 1-10 cents is for maintenance of way; 38 2-10 cents for maintenance of motive power and cars, and 56 6-10 cents for miscellaneous expenditures. "Maintenance of way" includes repairs of road, bridges, stations and buildings; "maintenance of motive power and cars" includes repairs of locomotives and cars and cost of fuel, oil and waste. The cost of fuel per mile run is 15 8-10 cents. "Miscellaneous expenditures" includes salaries, wages, and all items of cost not found in the foregoing, except interest.

The gross earnings for the year are $11,368,425.26, or about 25 per cent. of the whole capital stock, and 11 per cent. of the whole cost of road and equipment. Income over last year, $771,301.19. About 50 per cent. of the total earnings is received from passengers, and 43 per cent. from freight. The sum paid for interest is more than 20 per cent. of the gross receipts, amounting to $1,199,660.81.

The average income per mile operated is $9,766.69, from which, after deducting operating expenses and interest, there remains a net income of $2,319.19 per mile. The total net income is $3,169,902 41, and is 7 per cent. of the whole capital stock, and 4 2-10 per cent. of the whole cost of road and equipment.

Dividends were paid by ten corporations, amounting to $2,271,143, which amount is 6 4-10 per cent. on the paid in capital of all the roads in the State, and 3 per cent. on the cost of all roads and equipment. This amount is also 7 9-10 per cent. on the paid in capital of the ten dividend-paying companies.

The tabular columns of income from each passenger and ton of freight for each mile carried should show the exact average rate per mile received from passengers and freight for the year represented. The amounts in each passenger column are found by dividing the whole passenger receipts by the whole passenger mileage or "number of passengers carried one mile." An examination of the table will show that there must be errors. From the manner in which some companies have kept their account of each passenger trip, only an approximate amount for the passenger mileage can be obtained, in which case the rate for each passenger, as found by this process, would vary from the true rate. The average fare received on all roads as shown in this manner is 2 61-100 cents per mile for passengers, and 4 5-10 cents per ton for freight.

From the foregoing statistics, derived from the tables and returns herewith submitted in full, it would appear that while the operation of the railroads taken as a whole is not a failure, real success or prosperity is attained by only about one-half of the companies. The total net income of 4 2-10 per cent. on the whole cost of road and equipment is a less per cent. dividend on the whole investment than is received for interest by the holders of bonds.

The result here reached may assist in determining the propriety of regulating fares and freights by law. If 2 61-100 cents per mile is the average rate of fare a certain proportion of travel must have been at a lower as well as a higher rate. The class of people who have received the benefit of the lowest rate of fare are commuters and holders of season tickets, for the greater part men whose occupation is in cities but who live in towns and villages adjacent, and who daily go and return from their homes to their work. If a rate per mile was established by law, as low as was considered compatible with the successful operation of a railroad, the company conducting its operations would not, for it could not, consistent with its own success, provide lower rates for commuters and other every-day travelers. Such is the case on the New York Central road, where the limit by law is two cents per mile on all trains. No passenger, however often he may travel, can procure passage for any less.

[The Commissioners here quote from the Massachusetts Commissioners' report on the practical working of the limitation of rates to two cents per mile on the New York Central road and the injustice of a uniform rate.]

The views here given have a practical bearing upon the question of the expediency of establishing uniform rates by law. Whether special rates for different companies, established by law, would be better for the public at large than the present system of various and fluctuating rates, controlled by circumstances or by competition, is difficult to determine.

The list of accidents is given with the return of each company and covers the same period of time for which the return is made. The list given in the body of the report last year was brought forward to the time of writing the report, for which reason the list now given by each company covers a part of the same time, and some of the names given in the last report will thus be again found in this. The proportion of accidents for the time reported, or to the number of passengers carried, will not be affected, but the accidents for the year are thus made to conform to the other doings reported. The whole number for the year resulting in serious personal injury is 85; of these, 54 were fatal and 31 not fatal. But one accident resulting in the death of a passenger has occurred, and that was caused by jumping from the cars while in motion. No serious injury has happened to any passenger who kept in proper place, in conformity to rules and regulations, while more than ten millions of passengers have been transported. Of the whole number of accidents resulting in injury or death, 7 occurred to persons at crossings; 7 to persons jumping on or off the cars while in motion; 10 to persons falling from trains; 38 to persons walking or lying upon the track, 9 of whom were intoxicated; 6 to employees while coupling cars; 4 to boys stealing a ride; all others numbering 13.

As will be seen, the largest proportion of accidents occurs to persons walking or lying upon the track; some apparently sleeping in utter disregard of any danger, others incapable of comprehending any danger through intoxication. It is probably impossible to provide a remedy against such recklessness, but if a law was passed making it illegal for persons who are not employed on the road to walk on the track, it would assist in making the danger more apparent, and would, doubtless, deter some from taking this course.

Attempting to get on and off cars while in motion is another fruitful source of accidents. The warning plainly given by the fate of so many seems to have no effect in diminishing this dangerous practice. From the train newsboy, who daily and hourly repeats it, to the occasional passenger, who waits until after a train has started to speak his last word, then throws himself aboard, a large number seem to delight in taking this risk every year. It is difficult to see how legislation can be made to accomplish a reform in this respect.

Accidents of this class also frequently occur to boys and others, who take advantage of the opportunity afforded by the low rate of speed which trains are required to run across streets and at other places in cities, to cling to trains, thus endangering themselves and annoying both passengers and employees. On this point there is already a statute (act of 1865 and amendment of 1867) prohibiting such proceedings. The railroad companies hesitate to enforce the law and inflict the penalties prescribed, as in many cases a malicious disposition aroused would vent its spite in stoning cars at night, placing obstructions on the track, or other vicious acts, in which it would be impossible to trace the offender. The remedy would seem to be in the action or assistance of the local authorities, who could bring the offenders to punishment, and where regulations making such opportunities possible are established for the very purpose of preventing accidents, it is but justice that the local authorities should render every assistance to prevent this dangerous practice.

[Here follows detailed accounts of the two most serious accidents to passenger trains within the year.]

The condition of each road and the particular business pertaining to it are more fully given hereafter in the separate report of each company. In general, the good condition and careful management before reported have been sustained, and the business has increased. A great improvement has been made in the rolling stock by the application of the Westinghouse brake and the Miller platform and coupler now in use upon several leading roads. The proof is abundant of the superiority of these inventions for the better working of trains and the prevention of accidents. Some self-coupling device applicable to freight trains is greatly needed, and would lessen the danger to employees.

Several petitions have been received and acted upon by this Board, asking for gates or flagmen to be stationed at highway crossings. Only two flagmen have been established by the Board since rendering the last report, one at Stamford, on the New York, New Haven & Hartford, the other at Yantic, on the New London Northern.

To determine what would be for the public safety and interest is made the duty of the Commissioners in this matter, and is sometimes difficult to do. The danger at grade crossings cannot be wholly removed, but by the exercise of the greatest caution to observe approaching trains it may in most cases be avoided. But there is a question as to how far a railroad company may be justified in levying this contribution of care upon a whole community, and at what point the company should itself be made to take up the burden.

Reference was made last year to the necessity of an amendment of the laws in regard to fences on the roads laid out and built before the passage of the present laws. The necessity still exists. On three different roads, the Housatonic, the New Haven & Northampton, and the Norwich & Worcester, a considerable portion of the line has no fence adjoining private land owners. That the whole line of a railroad should be fenced is conceded by all, on grounds of public safety, and is proved by the fact that the law now requires all companies on taking land for railroad purposes to fence the same. An extended report of the action of the Commissioners in one case upon this point may found in the remarks concerning the New Haven & Northampton Company. As will there be seen, the Commissioners are restrained by decision of the Superior Court from proceeding further in the case in question. In view of the impracticable application of the laws in this and many other cases, the Commissioners respectfully urge upon your honorable body the necessity of a thorough revision of the laws in regard to fencing.

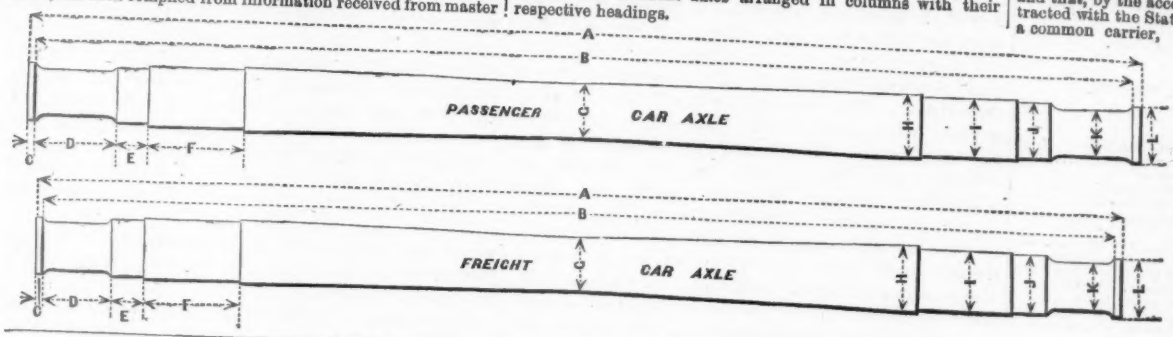
A great mistake is made and a public injury inflicted by the failure of railroad companies to conform to the established time for the running of trains. Accidents may occur making failures and delays unavoidable in particular cases, interruptions to which all will reasonably submit, but their daily and continued occurrence should not be looked upon with allowance. The company agrees to transport passengers a certain distance, within a certain time, for a fixed remuneration. A continued daily failure on the part of any company to carry passengers the whole distance proposed and paid for would not be submitted to, especially if pay for carrying the whole distance was retained. Whatever argument will show that passengers should be carried the distance agreed, will also show that they should be carried in the time agreed, for both are conditions upon which the traveler depends. To the man of business it is often of vital importance to reach a certain place, or make a certain connection, as he has previously planned. With the certainty or probability that he could not accomplish it, he would adopt some other course. The failure of a company to carry him within the specified time is as great an injury as if it had failed to carry him the specified distance.

The remedy is to be found in a more careful calculation of the resources of the company; for its ability to carry a large or small number of passengers within a certain time depends upon the promptness with which they can be received or discharged at stations, the capability of the rolling stock, especially the motive power, and the condition of the road and track to be used. A lack in any of these departments should not be an excuse for the daily delay of trains, for the ability to do a certain specified thing should not be assumed, but established upon fact, and being established may become the basis of a reliable agreement. If then for any of these reasons the time has been so fixed that the company agrees to do something it cannot do, the time should be changed to conform to what the company, with the means it has at command, actually can do.

Dimensions, etc., of Standard Car-Axles Used on Different Railroads.

The following table, showing the sizes of the *standard* car-axles, has been compiled from information received from master car builders and master mechanics, and is believed to be correct, or as nearly so as the information received would admit of making it.

The dimensions are indicated by letters in the cut, and the sizes of the different axles arranged in columns with their respective headings.



Name of Road.	Gauge of Road.	Description of Axle.	Number in use.	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.
	ft. in.			ft. in.	ft. in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Atlantic & Great Western (Main Line)	6	Pass. and Frgt.	11,180	8	7 11	½	6	2⅛	6⅞	4	4½	4⅜	4	3¼	4
" " " (Branches)	4 9¼	" "	7,080	6 9⅜	6 8⅝	½	6	2⅛	6⅞	4	4½	4⅜	4	3¼	4
Atlantic, Mississippi & Ohio	5	Passenger	284	7 1	.....	.....	6½	1⅝	7¼	3½	4¼	4⅛	4	3¼	4
Atlanta & West Point	5	Freight	3,624	6 10	.....	.....	5½	1⅝	7¼	3½	4¼	4⅛	4	3¼	4
Atlantic & Pacific	5	Pass. and Frgt.	250	6 11¼	6 10¼	½	5½	1⅝	7¼	3½	4¼	4⅛	4	3¼	4
Baltimore & Ohio	4 8½	" "	3,000	6 7½	6 6	⅜	6	2⅜	7½	3⅜	4	3⅜	3⅜	3	3⅜
" "	4 8½	Passenger	.....	6 9⅞	6 7⅛	⅜	6¼	2⅜	7½	4	4⅜	4½	4⅛	3½	4⅛
Belvidere Delaware and Flemington	4 10	Freight	.....	6 6	6 4¾	⅝	5	1⅝	7¾	4¼	4⅜	4½	4¼	3⅜	3⅛
" " " "	4 10	Passenger	168	6 8½	6 7½	½	5½	1⅝	7¾	3⅝	4¼	4	3⅝	3	3⅝
Boston & Albany	4 10	Freight	2,240	6 10	6 9	½	5⅝	1⅝	7⅜	3¾	4	3⅞	3⅝	3	3⅝
Boston, Hartford & Erie	4 8½	Pass. and Frgt.	.....	6 6½	6 4⅞	½	6½	1⅝	7¾	4	4	3⅞	3⅝	3	3⅝
" " "	4 8½	Passenger	180	6 6½	6 5¼	⅝	5½	1⅝	7½	3¾	4½	4¼	3¾	3¼	3¾
Boston & Providence	4 8½	Freight	1,000	6 6½	6 5¼	⅝	5½	1⅝	8	4	4½	4⅜	3⅞	3¼	3⅞
Boston, Lowell & Nashua	4 8½	Pass. and Frgt.	400	6 6¼	6 5¼	⅝	5½	1⅝	8	3¾	4¼	4½	3⅞	3¼	3⅞
Buffalo, Corry & Pittsburgh	.....	" "	2,000	6 6¼	6 5¼	½	5½	1¾	6¾	3⅝	4⅜	4¼	3¾	3¼	3¾
Burlington & Missouri River	.....	" "	.....	6 6¼	6 5¼	½	5⅝	1½	7¼	3¾	4¼	4	3¾	3	3¾
Catasauqua & Fogiesville	4 8½	" "	5,500	6 8⅝	6 7⅞	⅝	5⅞	2	7	3½	.....	4½	3¾	3⅜	3⅞
" "	.....	Passenger	3	7	.....	⅝	6½	1¾	7	3¾	4¼	4½	4	3¼	4
Central Railroad of New Jersey	.....	Freight	300	6 7	.....	⅝	6	2¼	7	4	4	3⅞	3⅛	.....	.....
" " "	4 8½	Passenger	260	6 9	6 8	⅝	6	1¾	7	4	4	3⅞	3⅛	3¼	.....
Central Pacific of California	4 8½	Freight	1,600	6 7¼	6 6¼	½	6	2½	7¼	4	4⅝	4½	4	3⅜	4
" " "	4 8½	Pass. and Frgt.	12,766	6 7	6 5½	¾	5½	1¾	7¼	3¾	4⅜	4¼	3⅝	3¼	3¾
Charlotte, Columbia & Augusta	5	Sleeping Car	84	6 11¼	6 9¾	¾	5½	1¾	6⅞	4	4⅜	4⅜	3¾	3¼	3¾
Chicago & St. Louis	4 8½	Pass. and Frgt.	696	6 10¾	6 9¾	¾	7	2	7¼	4	4⅝	4⅜	4¼	3½	4¼
Chicago & Northwestern (Galena Division)	4 8½	" "	2,048	.....	6 8	.....	6	1½	7½	3¾	4¼	4⅜	3¾	3¼	4
Connecticut River	4 8½	" "	8,912	6 10	.....	.....	6	.....	8	4	4¾	4⅝	4⅜	3¼	4¼
Cleveland & Pittsburgh	4 8½	" "	1,404	6 6¾	6 5¾	.....	6	2½	8	.....	4⅝	4½	4¼	3½	4¼
Cincinnati, Hamilton & Dayton	4 10	" "	8,672	6 10¾	6 9¾	½	6	2¼	8	3⅞	4¼	4⅝	4⅛	3¼	3¾
Connecticut & Passumpsic Rivers	4 10	" "	.....	6 9	6 7⅞	½	5½	1¾	6¾	3¾	4¼	4⅝	3¾	3	3¾
Cumberland & Pennsylvania	.....	" "	.....	6 6	6 4⅞	⅜	5½	1¾	7½	3¾	4¼	4⅜	3⅞	3¼	3⅞
" "	4 8½	Passenger	20	6 6⅝	6 5¾	⅜	5	1¾	6¾	3¾	4⅜	4¼	3½	3¼	.....
Des Moines Valley	4 8½	Freight	1,500	6 8¼	6 7¼	½	5¾	2¼	7⅝	3½	4¼	4	3¾	3¼	3¾
" "	4 8½	Passenger	80	6 7	6 5½	½	5⅝	2¼	7⅝	3½	4¼	4	3¾	3	3¾
Dutchess & Columbia	4 8½	Freight	2,000	6 7	6 5½	¾	5½	2	7	3⅝	4⅛	4	3⅞	3¼	4
Eastern	4 8½	Freight	100			¾	5½	2	7	3⅝	4⅛	4	3⅞	3¼	4
Eastern Kentucky	4 8½	Pass. and Frgt.	4 800	6 6	6 5	½	6¼	.....	.....	3¾	4¼	4	3⅞	3¼	3⅞
" "	5	Passenger	.....	6 10	6 9	½	6	2	7	4	4⅜	4⅛	3⅞	3¼	3⅞
Evansville, Henderson & Nashville	5	Freight	.....	6 9	6 8	½	6	2	7	4½	4¼	4⅛	4⅛	3¼	4¼
Fitchburg	5	Pass. and Frgt.	104	7 1	.....	.....	7	2¼	7	4	4⅛	4	3⅞	3¼	3⅞
Flint & Pere Marquette	4 8½	" "	448	6 6⅝	6 5⅝	½	5⅝	1½	7	3⅜	4⅜	4¼	4⅛	3¼	3⅞
Georgia Central	4 8½	" "	2,992	6 7	6 5½	¾	5¾	2	6½	4	4⅝	4¼	3⅞	3¼	3⅞
Grand Trunk of Canada	5	" "	3,140	7	6 11	½	6¼	2½	7⅛	4	4⅝	4¼	4	3⅜	4
Great Western of Canada	.....	" "	.....	7	9¼	⅝	6¾	2	7⅜	4	4	3⅞	3¾	3	3¾
" "	4 8½	" "	10,500	6 6⅝	6 5⅝	⅝	5⅞	2	7⅜	4⅛	4½	4⅜	4⅛	3¼	.....
Hartford, Providence & Fishkill	4 8½	Sleeping Car	740	6 10	6 8½	⅝	6¼	2	8¼	4	4⅞	4⅝	3½	3¼	3½
Hartford & New Haven	4 8½	Pass. and Frgt.	1,700	6 6⅝	6 5⅜	⅝	5½	1¾	7	3⅜	4½	4¼	4⅛	3½	4
Hannibal & St. Joseph	4 8½	" "	2,842	6 6	6 5	½	5½	1¾	7⅝	3⅜	4½	4¼	4⅛	3¼	3¾
Housatonic	4 8½	" "	.....	6 9½	6 8	¾	6½	2	7⅝	3⅞	4½	4⅜	4	3	3½
"	4 8½	Passenger	72	5 11	6 9½	¾	5½	1¾	8	4	4½	4⅜	4	3¼	4
Illinois Central	4 8½	Freight	1,728	6 9	6 7½	¾	5½	1¾	8	4	4½	4⅜	4⅛	3¼	4⅛
Indianapolis & St. Louis	4 8½	Pass. and Frgt.	18,900	6 9	6 7¾	⅝	6	1½	8	4	4½	4⅜	4⅛	3¼	4⅛
Jeffersonville, Madison & Indianapolis	4 8½	" "	1,008	6 9¼	6 8¼	½	6	.....	10	3⅝	4⅝	4⅜	4	3¼	4⅛
" "	4 8½	Passenger	.....	6 9	6 8	½	7	1⅞	7	3⅞	4⅞	4½	.....	3½	.....
Kansas Pacific	.....	Freight	.....	6 9	6 8	½	7	1⅞	7	3⅞	4⅞	4⅜	4	3½	4⅛
Kentucky Central	.....	Pass. and Frgt.	.....	6 8½	6 6¼	⅝	5½	1⅞	8	3⅝	4⅝	4¼	4	3½	4⅛
Lackawanna & Bloomsburg	5	" "	1,112	6 9½	6 8	¾	5½	2½	7	3⅝	4⅝	4⅛	4	3¼	.....
"	4 8½	Passenger	.....	6 8½	6 7½	½	6	1¾	6⅞	3¾	4¼	4⅛	3¾	3	3¾
Lake Shore & Michigan Southern	4 8½	Freight	.....	6 8	6 6¾	½	6	1¾	7⅛	3¾	4¼	4⅛	4	3¼	4
" " " "	4 & 9¼	Passenger	250	7 ¼	6 11	⅝	6¾	.....	.....	4	4	3⅞	3¾	3	3⅞
Lehigh Valley	4 8½	Freight	5,000			⅝	5⅝	.....	7	3¾	4¼	4⅛	3⅞	3¼	4⅛
"	4 8½	Passenger	200	6 10¾	6 9¼	¾	6½	2⅜	6½	4⅜	4¼	4⅛	3⅞	3¼	.....
Maine Central	4 8½	Freight	32,000	6 10¾	6 9¼	¾	6½	2	6½	4⅜	4½	4¼	4	3¼	4
Marquette & Ontonagon	4 8½	Pass. and Frgt.	3,832	6 6½	6 5⅜	½	5⅞	1¾	7	3½	4	3⅞	3¾	3	3¾
"	4 8½	Passenger	40	6 9½	6 8	¾	5½	2	7	4	4	3⅞	3⅝	3¼	3⅞
Milwaukee & St. Paul	4 8½	Freight	1,914	6 8½	6 7	¾	5½	1½	5¾	4	5	4⅞	4¼	3⅜	4¼
Missouri, Kansas & Texas	4 8½	Pass. and Frgt.	1,000	6 10	6 9	½	5½	2½	7½	3¾	4¼	4⅛	4	3½	4
Missouri River, Fort Scott & Gulf	4 8½	" "	2 484	.....	6 7	.....	6	.....	.....	.....	4½	4⅛	4	3⅜	4
New Orleans, Mobile & Texas	5	" "	1,260	6 8½	6 7⅜	⅝	6	2	7½	4	4½	4¼	4	3⅜	4
New York & Harlem	4 8½	" "	1,711	7 1¾	7 1¾	¾	6	3	8	3¾	4½	4⅜	4	3¼	3¾
New York & New Haven	4 8½	" "	3,600	6 9	6 7½	¾	5½	2	.....	3¾	4½	4⅜	4	3⅜	3⅞
"	4 8½	Passenger	1,900	6 10¼	6 9	⅝	6	1⅜	8½	4	4⅞	4⅝	4	3¼	4
New York, Boston & Montreal	4 8½	Freight	500	6 8¾	6 7½	⅝	6	1	8	3¾	4⅝	4½	.....	3½	4¼
New York & Oswego Midland	.....	Pass. and Frgt.	..	6 10	6 8¾	⅝	6	.....	.....	.....	4½	4¼	4	3¼	4
"	.....	Passenger	.....	6 8	6 6¾	⅝	5⅝	2½	7	3¾	4¼	4⅜	3⅝	3¼	3⅞
New York Central & Hudson River	4 8½	Freight	.....	6 7	6 6¼	⅝	5⅝	2½	7	3¾	4¼	4⅜	3⅝	3⅜	3⅞
" "	4 8½	Passenger	11,000	6 9	6 7½	¾	6	.....	4	3¾	4¼	4⅜	3⅝	3⅜	3⅞
Northern Pacific	4 8½	Freight	30,000	6 6½	6 6¼	¾	6	.....	4	4⅝	4½	4⅜	3⅝	3⅜	4⅜
Norwich & Worcester	4 8½	Pass. and Frgt.	8,968	6 10½	6 9¼	⅝	7	.....	9	3¾	4⅜	4¼	4	3½	4⅜
Ohio & Mississippi	4 8½	" "	.....	6 6	.....	.....	5½	.....	9	3⅝	4¼	4⅛	.....	3½	4⅜
Old Colony & Newport	4 8½	" "	10,680	6 10	6 8¾	⅝	6	3	7	3½	4¼	4⅛	.....	3½	4⅜
Panama	5	" "	4,680	6 6½	6 5	¾	5½	1⅝	7	3¾	4⅜	4⅛	4¼	3½	4⅝
Philadelphia & Reading	4 8½	" "	.....	6 11¼	6 10	⅝	6	2	7	3¾	4¼	4⅜	3¾	3¼	4
Pittsburgh, Fort Wayne & Chicago	4 9½	Freight	56,000	7 1½	7 ½	½	8	3	6¾	.....	4¼	4⅛	3½	3¼	3¾
"	4 9½	"	20,000	6 10	6 8¾	⅝	7	1¾	6¾	4	4½	4⅜	4¼	3¼	4
Pittsburgh, Cincinnati & St. Louis	4 9½	6-wheel Truck	120	6 11	6 9¾	⅝	7	†	9⅜	3¾	4¼	4⅜	†	3¼	4
Portland & Kennebeck	4 9½	Pass. and Frgt.	8,200	6 11	6 9¾	⅝	7	1¾	6¾	4	4½	4¾	4⅛	3¼	4
Port Huron & Lake Michigan	4 8½	" "	739	6 6⅔	6 5	¾	5⅝	1¼	.....	3½	4	3¾	3¼	3¼	3¾
"	.....	Passenger	.....	6 11	6 10	½	6	3	7	3¾	4¼	4	3¾	3¼	3¾
Providence & Worcester	4 8½	Freight	.....	5 9	6 8	½	5	3	7	3¾	4¼	4	3¾	3¼	3¾
"	4 8½	Passenger	800	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	3¼	3¾
Providence, Warren & Bristol	4 8½	Freight	160	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	3	.....
Raleigh & Gaston and Raleigh & Augusta	4 8½	Pass. and Frgt.	102	6 6½	.....	.....	.....	.....	.....	.....	.....	4	.....	3¼	.....
Richmond, Fredericksburg & Potomac	.....	" "	.....	6 6⅝	6 5⅝	½	5½	2	7	3¾	4⅜	4½	3⅜	3¼	3⅜
Richmond & Petersburg	4 8½	" "	508	6 7	6 6	½	5½	2¼	7	3¾	4⅜	4⅛	3⅜	3¼	3⅜
Southern Pacific of California	4 8½	" "	576	6 7	.....	½	5½	1½	7	3⅝	4⅜	4¼	3¾	3½	3¾
"	4 8½	" "	708	6 10½	6 9	¾	5½	1½	7½	3½	4¼	4	3¾	3¼	3¾
St. Louis, Kansas City & Northern	4 8½	" "	.....	6 6¼	6 4¾	¾	5½	1½	7½	3½	4¼	4	3¾	3¼	3¾
St. Louis, Vandalia, Terre Haute & Ind	4 9	" "	2,040	6 11	6 9¾	⅝	6½	2⅝	7½	3⅞	4⅜	4½	4¼	3½	4½
Terre Haute & Indianapolis	.....	" "	2,000	6 9	6 8	½	6	1¾	7½	3⅝	4¼	4⅛	3⅝	3¼	3⅝
Toledo, Wabash & Western	.....	" "	.....	6 9	6 7¾	½	6	1¾	7½	3⅝	4¼	4⅛	3⅝	3¼	3⅝
Troy & Boston	4 8½	" "	17,500	6 8	6 6½	¾	5⅝	.....	7	4	4¾	4½	3⅝	3¼	3⅝
Vermont Central	4 8½	" "	956	6 6⅝	6 5⅝	⅝	5½	1½	7¼	4½	4⅜	4	3½	3¼	3½
Wilmington, Columbia & Augusta	4 8½	" "	3,100	6 6	6 5	½	5½	1¾	6¾	3¾	4⅜	4¼	4	3¼	3¾
" " "	5	Passenger	48	7 2	7 ½	¾	7	2½	6½	.....	4¼	4⅛	3⅝	3¼	3⅝
	5	Freight	1,352	6 11	6 9½	⅝	5½	2⅛	6½	.....	4¼	4⅛	3⅝	3¼	3⅝

*No collar. †No shoulder between E and F.

Railroad Law in Illinois as Interpreted by its Supreme Court.

In reply to a request that he would state "what is the present condition of the law, as found in the decisions of the Supreme Court," ex-Governor John M. Palmer, of Illinois, has published a letter in which he says:

The Court decided, many years ago, that the charters of private corporations are contracts between the State and the corporators, with which the Legislature cannot interfere, but the Court also holds that the contracts between the State and corporators are mutual, and that the corporation, when created, is what the law makes it, and by the acceptance of the charter the corporation becomes what the Legislature intended it should be, that it possesses only such functions and powers as the act creating in confers, and assumes such duties as the act of incorporation imposes.

That acts creating railroad corporations were passed for the public benefit and advantage; that they were intended to create an incorporation to engage in the business, office and employment of a common carrier, and that, under their charters, they possess all needful powers for the prosecution of that business, and that, by the acceptance of the charter, the corporation contracted with the State to exercise the office and employment of a common carrier, and to discharge all the obligations and duties according to the laws then, or that might thereafter, be in force for the government of common carriers.

That it is the law that common carriers are bound to furnish reasonable and ordinary facilities for transportation, such as will meet the usual and ordinary demands of the public; and with respect to an unusual influx of business, they are bound to make an honest and fair effort to aid the public in the prosecution of their business.

That it is the law that common carriers are bound to carry for all persons indifferently, without partiality, favoritism, or unjust discriminations; and that if they do not provide themselves with reasonable facilities for transportation, such as will meet the usual and ordinary demands of the public, or if their servants from improper motives give a preference to one person, the carrier is liable in damages to the party injured.

That it is the law that common carriers may demand a reasonable compensation for their services and no more.

That it is the law that railroad corporations may make such reasonable regulations and contracts for the transaction of their business as are not inconsistent with their duties to the public as common carriers, and can make no other, and that all rules, regulations, contracts, or other means adopted by railway corporations to justify extortions, unjust discriminations or abuses, are unwarranted by their charters and contrary to their duty to the public, and are void.

It cannot be expected that the law as established by the decisions of the Supreme Court will be satisfactory to all persons or to all interests.

There is something in the sacred mystery of "vested rights" that affects the imagination of many as witchcraft did our ancestors, and such men will hardly be satisfied with the severe simplicity of the doctrine settled by the courts, that railroad corporations have a vested right to be common carriers, and that the public have the vested right to insist that they shall discharge the duties of common carriers according to the laws of the land, without partiality, injurious discriminations, extortion or abuse, and there may be others who would appeal to the Congress of the United States, or the Legislature, to fix arbitrary tariffs of rates for railroad services; but the great body of intelligent people will, I believe, prefer the verdicts of juries to the decisions of politicians, and when the law that throws the burden of proof of reasonableness upon the corporations is applied, and juries pass upon all questions in dispute, I do not believe that there can be any serious question as to the result.

Cost of Working Roads of 7-feet Gauge.

Herapath's Railway Journal, commenting on a letter from Mr. P. H. Watson concerning the prospects of the Erie Railway, says:

"If Mr. Watson, the President, means by the expression in his report dated August 7, 1872, recently published, that 'though I believe that a narrow-gauge road may pay largely on its cost, while one of six feet may be worked without profit,' to state that a six-feet gauge costs materially more in working than a 4ft. 8½in. gauge, we entirely dissent from his views. In England we have long had a seven-feet gauge line or lines at work, and though at one time it was ignorantly said neither the Great Western nor Bristol & Exeter line could ever pay as long as it was broad gauge, the expense of working being so heavy, actual experience has proved such opinions or notions to be utterly erroneous, as we long ago said they were. Our very broad seven-feet gauge costs no more to work than our narrow gauge of 4ft. 8½in. This is *fact*. The Great Western, for sound traffic reasons, has now become more of a narrow than a broad-gauge line, and for the same reasons the Bristol & Exeter, South Devon and Cornwall lines will eventually change their gauge from broad to narrow. The Great Western being in a great measure narrow gauge, we will not particularly refer to, but go to the Bristol & Exeter and South Devon lines, both broad seven-feet gauge, and compare their percentage of working expenditure with that of the Great Northern narrow-gauge line, 4ft. 8½in. It will be seen that the broad-gauge lines are worked at a rate quite as low as the narrow gauge:

	Percentage of working expenditure last half year
Bristol & Exeter (broad)	45.56
South Devon (broad)	44 25
Great Northern (narrow)	49.36

"We should have preferred comparing with the (narrow) London & Northwestern, (narrow) Midland, or (narrow) Southwestern, lines nearer the Bristol & Exeter and South Devon than the Great Northern, but neither the London & Northwestern, the Midland, nor the Southwestern states the percentage of its working expenditure; it is evident, however, that they are all quite up to the mark of the broad-gauge lines in percentage of expenditure:

	Gross receipts Last half year.	Expenditure
London & Northwestern	£4,249,363	£2,046,978
Midland	2,518,434	1,279,037
Southwestern	1,049,573	536,993

"We may add that the expenditure of the Great Western, partly broad and partly narrow gauge, last half year, was 47½ per cent., or quite as high as the purely broad-gauge lines. These ascertained facts prove beyond question that traffic is worked on a broad-gauge line just as cheaply as on a narrow-gauge one."

Calculating the percentage of expenses to earnings of the roads of standard gauge, for which *Herapath* above gives only the gross receipts and expenditures, we find them to be:

London & Northwestern	48.17
Midland	
Southwestern	50.78
	53.07

We may add that the working expenses of the entire railroad system of the United Kingdom varied from 47 to 50 per cent. of their gross receipts for the 20 years ending with 1871, being 49 per cent. in 1868 and 1869, 48 per cent. in 1870, and 47 per cent in 1871, so that all the 7-feet lines mentioned by *Herapath* seem to have had less than the average expenses in the Kingdom, though we have not full returns for the last half of 1872, which is the one quoted. Moreover, an inspection of the returns of all the British railroads for 1871 shows that only three lines in the Kingdom had a lower percentage of working expenses than the 7-feet South Devon line.

RAILROAD GAZETTE

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S. WRIGHT DUNNING AND M. N. FORNEY.

CONTENTS.

Editorial Announcements.

Removals.—The Chicago office of the RAILROAD GAZETTE *has been removed to No. 77 Jackson street, opposite Third avenue.*

The New York office of the RAILROAD GAZETTE *is removed to Room 131, No. 73 Broadway, opposite the upper elevator landing.*

Correspondence.—We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

FRICTION OF JOURNAL BEARINGS.

One of the most important subjects to come up for consideration at the Car Builders' Convention is that of a standard for the form and proportions of car axles. The necessity for some action establishing uniformity for the present condition of things is indicated very plainly by the table on another page, in which the dimensions of over 100 axles are given. It must be remembered, too, that these are only what are regarded as the *standard* sizes on the roads where they are used, and do not include those very indefinite forms and proportions which are *not* standard.

To those who have had any care of the repairs of cars, it is of course not necessary to say anything of the advantages which would result from the adoption of some uniform pattern for axles used on all 4 ft. 8½ in. gauge railroads. Almost any of the sizes given in the table would, if generally adopted, be better than the present diversity; but if the subject is up for consideration, it will of course be wise to give it very full and careful consideration, so as to fix not only upon *some* standard, but, as far as possible, upon the *best* standard. What is most to be feared now is, that the desire to realize the benefits which would attend uniformity will cause the members of the Association to be too hasty in their action, and thus establish a standard which more careful consideration would show not to be the best. The discussion which has thus far been carried on indicates that there exists great difference of opinion regarding the best sizes for the diameter and length of journal. This and the best method of strengthening axles next to the hub of the wheel on the inside are probably the main points about which there is likely to be any material difference of opinion. Unfortunately there is still, among many otherwise skillful mechanics, a great lack of accurate information regarding the laws of friction, which to a great extent should determine the proportions for the journals of a standard axle. Many such will not believe that friction "*is proportioned to the pressure, and is independent of the area of the surfaces in contact.*" This has been proved over and over again, and is as clearly demonstrable as the law of gravitation. As long ago as 1649 experiments were made establishing it, and in 1781 more complete experiments were tried by Coulomb, and the results presented to the French Academy of Sciences. In 1831, '32, '33 and '34 Morin made his celebrated experiments at Metz, and they all without exception confirmed these conclusions. There is, however, a limit to the exactness of the above law, which has an important bearing on its application to the proportion of car journals. The law as stated is true so long as the pressure is not sufficiently intense to force out the oil or grease from between the surfaces. When this limit is reached the friction increases more rapidly than in simple proportion to the pressure. The higher the velocity of the rubbing, the lower will be the pressure at which the lubricant will be forced out from between the surfaces. It must be observed, too, that the pressure requisite to expel the lubricant is measured by the amount per square inch of the surface in contact. The pressures which will do this have not yet been accurately determined. It is, however, certain that increasing the size of the surfaces in contact, which in the case we are considering would be the journals and bearings, will not increase the friction; whereas if they are too small, the oil will be forced out from between them, thus causing abrasion and a greater resistance than is due to well-lubricated surfaces.

This can be stated in a different way: It has been found that the power required to turn a well-oiled axle in its journal is only about one-twentieth of the load which rests on the bearing; whereas without lubrication it requires one-fourth the load, or five times the power. Between these two limits there is every degree of frictional resistance, according to the condition of lubrication. If, then, the weight per square inch of surface is so great as to force out the oil from between the journal and bearing, then, evidently, good lubrication will be impossible, and consequently the friction will be very much increased. It will be seen, therefore, that in this view of the case, while there is nothing to lose by enlarging the journal, there may be a very great loss from having it too small.

If, however, any considerable increase is made in the surface of car journals, they must be enlarged in diameter, because if the addition is made to their length alone they will be liable to spring and break. If their diameter is enlarged, it is said that the friction will be increased, because the distance traveled by the circumference of a large journal, in each revolution of the wheel, is greater than that traveled by a small one; or, to state it in a different way, the power required to overcome the friction of a large diameter journal is greater than that for a small one, because the proportion between the diameter of the wheel to that of the journal is less; or, in other words, the power exerted at the circumference of the wheel has less "leverage" to overcome the friction at the journal. Undoubtedly this reasoning is correct, providing the resistance due to the rubbing alone is the same in both cases. But, as we have already stated, while with good lubrication this resistance is only one-twentieth of the load, if the oil is forced out from between the bearings it will be increased to a greater or less extent up to one-fourth of the load, if all the oil is forced out, as is not infrequently the case. Let us then estimate how much the resistance would be increased by enlarging the diameter of the journal from 3½ to 4 inches, supposing the surfaces and friction of the journals to be the same in both cases. A frictional resistance of 100 pounds at the smaller journal would be overcome by a force of 9.85 exerted at the circumference of the wheel, whereas with the larger journal a force of 12.12 pounds would be required, or nearly 25 per cent. more. If, however, the large journal is more certain of being thoroughly lubricated than the small one, there may be, and probably is, a much greater difference, due to this cause, in the friction in the two journals, than there is between the power required to overcome a given resistance in the large and in the small journals referred to above. The friction of an axle with merely ordinary lubrication is stated in Molesworth's tables to be nearly 50 per cent. greater than it is with continuous lubrication, and when "greasy and wetted" it is nearly three times as great as with "ordinary lubrication." Morin's celebrated experiments, to which we have already referred, indicate very clearly the great influence which the constant renewal of the lubricant has in diminishing the ratio of the friction to the pressure. In some cases the frictional resistance was only one-twentieth of the pressure, whereas in other cases, where the lubrication was less perfect, it was over one-tenth. If, therefore, an increase in the size of journals will facilitate lubrication, it seems probable that the advantage resulting therefrom will much more than compensate for what is lost in other ways. Fortunately, too, we can refer to some practical experience which sustains this view. In another part of this paper we give an engraving of a journal and axle-box designed by Mr. C. A. Smith, of the Erie Railway, and put into practice by him. The journal is 7 inches long by 4 inches diameter. In a previous number we have referred to his experience with these journals, and therefore we will only repeat now that those which he put under a car which weighed 58,000 lbs., or 4,833 lbs. on each wheel,* ran 27,768 miles, and at the end of that time the lead with which the bearing was coated about a sixteenth of an inch thick was not worn through to the brass, showing that the lubrication was very perfect during all the time it was running. The experience of the Reading Railroad Company with journals 3¾ inches in diameter has been equally satisfactory. In fact, we have never heard any objections urged against large journals, except from those who have never used them. All car-builders who have tried them are strong advocates of their use, and it certainly seems to savor of old-fogyism for those who really have no experience which enables them to judge of the advantages of large journals to interpose their inertia in the way of this much needed reform.

The weakness of axles next to the hub of the wheel on the inside, which is indicated by the great number which break at that point, should also receive the attention of master car-builders. The fact that probably nine-tenths of the axles which fail break at that point is a tolerably certain indication that they are weaker there than anywhere else. This could be remedied either by taking some material from the other parts of the axles and enlarging them at the point where they break, which would equalize their strength, or by increasing the size of their weakest part, which would practically make the whole axle stronger. Many car-builders attribute the fractures which occur next to the hub to the influence of the sharp shoulders ordinarily turned at that point, which are said to "invite" fracture. Doubtless a shoulder has some such effect, but we are inclined to believe that the influence attributed to that cause has been exaggerated. At any rate it is so important to have a shoulder of some kind, as a gauge in pressing on wheels, that probably the danger incurred from careless workmanship, and thus getting the wheels either too close together or too far apart, would be greater than the tendency to fracture produced by a properly formed shoulder. The evil, we believe, could best be cured by enlarging the axle in the hub of the wheel and making the part between of a different form, so as to distribute the "spring" of the axle over a greater part of its length, instead of concentrating it next to the hub, as is now the case.

The subject is deserving of thorough discussion, and as it is the first and probably the most important step towards establishing greater uniformity, and will probably lead to the adoption of a standard journal, bearing and box, and ultimately to a standard truck, no hasty decision should be made, but the whole subject should be investigated with the greatest care. An unwise decision now would defeat for a long time the object which it is so desirable to obtain.

DISCRIMINATING RATES.

The existing Illinois law concerning charges for carrying freight by rail was declared unconstitutional because it defined a certain act as an unjust discrimination and imposed a penalty therefor, without giving the party committing the act any opportunity to prove by testimony that the discriminations are not unjust. The Supreme Court, however, went out of its way to say that a discrimination made on account of competition would be an unjust discrimination, having itself no testimony on the subject. The Legislature has sought to remedy the present law by enacting that such and such acts shall be *prima facie* evidence of unjust discrimination, intending to make it the duty of the courts to hold the companies guilty unless they prove themselves innocent.

The railroad companies have all along held that the discriminations and other acts complained of are not in their nature against public policy; that, indeed, they are necessary to the most economical operation of the roads and to the maintenance of rates as low as they now are at points where they are highest. That is, they maintain that the discriminations, where they exist, are not unjust nor injurious; that a uniform rate, a variation from which the new law treats as *prima facie* evidence of an offense punishable by heavy fines, would be destructive to many industries and the business of some of the most important cities of the State, as well as of their own. But neither Legislature nor people are disposed to listen to their arguments, and the law was passed and its execution is expected with little opposition or apprehension so far as has been expressed in the Legislature or by the press.

Now it is probable that the railroad companies might successfully question the constitutionality of the new law as they did the old one; it is certain that, before an impartial and unprejudiced tribunal, they could prove that many of the discriminations complained of and made *prima facie* evidence of a punishable misdemeanor are not unjust. But such a course would more than ever

* The car had six-wheeled trucks.

embitter the people against the railroad companies and make probable such a revolution in the judiciary as would endanger the security of all property whatsoever, railroad and other. Moreover, it would not always be possible to prove that a discrimination is unjust, for it is often impossible for those best acquainted with a given traffic to decide what would be a just rate.

The railroad companies of Illinois—at least those which have termini in Chicago—are endeavoring to make such schedules of rates as will prevent the making of *prima facie* cases of unjust discrimination. The consequences, doubtless, will seriously affect the business of the State, and be such as ought to demonstrate to every citizen the propriety of discrimination in favor of special points, special industries and special kinds of traffic. But the people of Illinois—many of them at least—are not in a mood to be convinced; and the evils—perhaps amounting to positive calamities—which may be caused by such schedules of non-discriminating rates are likely to be charged, not upon the law which they are made to obey, but upon the railroad companies. Last year they were condemned for disobeying the law; this year we may see them even more fiercely condemned for obeying it.

It seems to us that too much stress has been given to the variable cost of carrying given weights the same distance. We have labored arguments over the influence of grades, the greater cost of station service per ton shipped at one station over another, the probability that cars used for shipments at some stations must be hauled empty to it for considerable distances, the difference in cost of damages to different kinds of merchandise, the influence of the prevailing direction of traffic, etc. But it needs to be better understood that any addition to traffic which brings, directly or indirectly, the smallest profit to a railroad company is an advantage to all the business done at higher rates. If a railroad company does my business at a profit of 50 per cent., and thus makes net earnings sufficient to pay its interest and dividends, shall I complain because it does other business at a profit of only 10 per cent? *Not if the company could not get that business at higher rates.* Whatever addition is made to its profits by this low-priced traffic decreases by so much the amount that I must contribut to the revenues of the company. The theory of classifications of freight is based upon this principle more than on anything else, though a different reason is often given for it.

No merchant should find difficulty in understanding this. Will a grocer admit that because he sells sugar at a profit of only 5 per cent., therefore he is morally bound to make no more than 5 per cent. on any of his goods? Certainly he will not; but having a trade which supports him, he will feel that any addition which he can make to it which will leave him any profit whatever will better enable him to compete with his rivals in trade, and will be an advantage and not a cause of complaint to his customers.

Criticism of the Master Mechanics' Convention.

A correspondent of the Chicago *Tribune* chides the members of this Association thus:

"BURLINGTON, IA., May 20, 1873.

"*To the Editor of the Chicago Tribune:*

"SIR—I was much interested in your editorial on this subject. The discussions and labors of such a body of practical men are, indeed, of great interest to the public. Vast as our railroad system has become, it is yet very far from perfect. When such men meet once a year, to the number of more than 100, representing all the leading companies, something surely must result from such a convocation.

"Well, let us see what was done. According to your dispatches from Baltimore, the Association met on Tuesday, May 13. The President announced a donation of $3,000 from the Committee of Reception of last year. The Vice-President also gave out the following programme: Tuesday afternoon, an excursion to Annapolis and visit to the Naval School; Wednesday afternoon, visit to Druid Hill Park; Thursday afternoon, visit to Mount Clare Works, Baltimore & Ohio Railroad—on which day the Association adjourned *sine die*. Friday was spent in visiting Washington city, and Saturday wound up the 'proceedings' with a visit to New York, and a grand banquet at the St. Nicholas Hotel, given by the railway supply men who had axes to grind.

"This, while brakemen and conductors on freight trains kiss their wives and babies every morning, uncertain whether they will ever see them again, but very certain they will be brought home, sooner or later, mangled corpses scarcely to be recognized, through the barbarous system of coupling cars now in use, but which any one of a dozen well-known devices would certainly obviate. This, while hundreds of passengers and railway employees were killed outright the past winter, other hundreds maimed for life and millions of dollars of property destroyed through the defects of the present shape of iron rails and axles, as adapted to the severity of our climate. The Association passed a flippant resolution deprecating compound axles, or those made of more than one piece of iron, when it is well known that any bar of metal made of more than one piece on which there is much strain, is relatively stronger than when made of a single piece, and that if one part of such a bar breaks the other will hold it together till the fracture can be detected and repaired.

"It is more than believed—it is pretty certainly known—that fully one half of the present destruction of life and property from couplers and broken axles and rails, might be obviated by an intelligent effort to do so. But what can be expected when such a body as the above meet their duties and responsibilities in such a way? While there is a time for all things, junketing and frolics certainly do not belong to such occasions as this.

"B."

The idea which the writer advocates, that the members of such associations should not indulge in any recreation during the sessions of their conventions, because the operatives of railroads are exposed to danger, is preposterous. If that theory were carried out to its ultimate results, it would prohibit all enjoyment so long as any grief and pain exist for us to prevent or alleviate. That the members of the Master Mechanics' Association should not visit such places as the Naval Academy or Washington City, because "brakemen and conductors are now uncertain when they kiss their wives and babies whether they will ever see them again," on account of "the barbarous system of coupling cars," is an inference the reason for which is not very obvious. We have no disposition to treat this subject in a spirit of levity, realizing as we do the horrible loss of life and the suffering and pain which are caused by accidents from coupling cars. That the subject should receive more attention from master mechanics is, we think, quite true; but the reason why it has not is not because they went to Annapolis or Druid Hill Park during the session of their convention. If the correspondent of the Chicago *Tribune* is looking for the reason why they do not give it more attention, he must look much deeper for the motive, or rather for the absence of one, than to their love of enjoyment, which master mechanics have in common with all the rest of the human race. It would be just as reasonable to say that they should not go to church on Sunday, nor go to picnics or tea parties, because brakemen and conductors are now exposed to danger, as it is to say that they should not go on excursions for the same reason.

That much needs to be done to make life and limb safer in the operation of coupling cars, is very true; but it is absurd to say that it is not done *because* the members of the committee referred to took a sail one day, a ride another, and a dinner the last. Motives of philanthropy have both a moral and an intellectual element in them, and it is simply idle to say that the master mechanics would become philanthropic if they had only refrained from riding and from eating and drinking. We do not for a moment intend to assert that they have done all that they should do; what we wish to make clear is, that the reason assigned for their shortcomings is not the true one.

The resolution which was passed expressing the opinion that no advantage would be gained by the use of loose wheels or compound axles, he describes as "flippant," which certainly is not true. The resolution may be unsound in theory, or express a misapprehension of facts; it may have been unwise as a question of expediency alone to adopt it; but it certainly was not flippant, and we believe that to the opinion expressed in it there was not a dissenting voice.

The suspicion does not seem to have crossed the mind of the writer of the letter that possibly the resolution, and those who adopted it, may be right and he wrong; nevertheless, it is not only possible but probable that such is the case, and that an axle made of one piece of metal is better than it would be if made of more. At the present time there is an annual crop of inventions of methods for using loose wheels, intended to accomplish imaginary advantages. The object of the resolution was simply to state as the opinion of the members, who are men of experience, that *no* advantage would be gained by the use of wheels which can revolve independently of each other.

The New Illinois Freight Rates.

The new freight tariffs which the Chicago railroad companies have been making, to comply with the law prohibiting discriminations which goes into effect on the 1st of July, are so far perfected that the several companies have got their schedules nearly ready for publication. The adoption of the new rates, it is believed, will make inevitable and necessary the abandonment by Chicago of all business at such points as Peoria, Bloomington and Rock Island. Merchants in Chicago will probably find it impossible to compete with Cincinnati and St. Louis, and the business will necessarily go to those points. On the Chicago, Rock Island & Pacific road, for instance, the rate for first-class freight from Chicago to Peoria is now 35 cents. After the 1st of July it will be 67 cents. For fourth-class freight the rate is 20 cents. It will then be 34 cents. On the same road between Chicago and Rock Island the rate now is 60 cents for first-class freight; after this month it will be 67 cents; and for fourth-class freight the rate is 25 cents, and will be 39 cents. Of course, under these circumstances the company must abandon all hope of retaining the business between Chicago and those competing points. St. Louis will undoubtedly gain, to a large extent, what Chicago loses. It is just so with the Chicago & Alton road, only the number of competing points is much larger on that line. This company, which has heretofore sent from four to five car-loads of merchandise daily from Chicago to Springfield, Jacksonville and Lincoln, expects to send nothing after July 1. The Indianapolis, Bloomington & Western road has so reconstructed its rates that it will take goods from Cincinnati to Lincoln for 33 cents per hundred, which is about half what the Chicago & Alton road will charge from Chicago to Lincoln after the 1st of July, although the distance between Chicago and Lincoln is not much more than half that between Lincoln and Cincinnati. One result of the new law—in truth, its principal effect—will be to change the routes of much of the business of the State of Illinois. The law will so operate that competing points will get about the same rates of transportation as heretofore, only the business will be done on lines which do not terminate in the State of Illinois. While this is the case with through rates, local rates are going to be higher than before, so that really the law promises to aggravate the very evils which it was enacted to remedy. Take the Chicago & Alton road, and its local rates, that is from point to point on the road, will be almost or quite double the present rates. The company abandons its business at the points where other roads cross, and increases its tariffs between all points where there is no competition; hence the farmers, for whose benefit the law was enacted, will find that they are not to be benefited by its operation. The great east-and-west roads will take the merchandise for Central Illinois to Bloomington, Peoria, Springfield, etc., and the north-and-south roads will distribute them to the points where they are to be consumed, at rates considerably in advance of the old ones.

American Bonds in Europe.

A large number of issues of railroad bonds are held chiefly in England and Germany, and the journals of those countries give quotations which are rarely seen here. As an illustration of the esteem in which such securities are held abroad, we copy quotations from London and Frankfort for May 10, and from Amsterdam for May 8, premising that the quotations are, of course, in gold, and that we must add about 18 per cent. to get the proper currency price:

LONDON.

Alleghany Valley Railroad	88	a	89
Atlantic & Great Western 1st mortgage $1,000	79	a	80
Atlantic & Great Western 2d mortgage $1,000	68	a	70
Atlantic & Great Western 3d mortgage	36½	a	37½
Atlantic & Great Western consolidated mortgage	—	a	—
Atlantic & Great Western, Bischoffsheim's certificates	45	a	47
Atlantic & Great Western reorganization scrip	96	a	98
Atlantic & Great Western leased lines rental trust	92	a	93
Atlantic & Great Western leased lines scrip, £60 paid	89	a	90
Atlantic, Miss & Ohio con. mortgage	60	a	65
Baltimore & Ohio	97	a	98
Baltimore & Potomac (Main Line) 1st mortgage	81	a	82
Baltimore & Potomac tunnel mortgage (guaranteed by Pennsylvania & North Carolina Railroad)	81	a	82
Cairo & Vincennes	75	a	77
Central Pacific of California 1st mortgage	81	a	83
Central Pacific (California & Oregon Division) 1st mortgage gold bonds scrip, 50 per cent. paid	79½	a	80½
Detroit & Milwaukee 1st mortgage bonds	70	a	72
Gilman, Clinton & Springfield 7 per cent. 1st mortgage gold bonds	86	a	88
Illinois Central $100 shares, all paid	90	a	92
Illinois Central redemption mortgage bonds	98	a	100
Illinois Central	80	a	83
Illinois & St. Louis Bridge 1st mortgage	98	a	100
Louisville & Nashville	91	a	92
Marietta & Cincinnati bonds	84	a	88
Memphis & Ohio 1st mortgage bonds	103	a	105
Michigan Central Sinking Fund, 1st mortgage	85	a	90
Milwaukee & St. Paul 1st mortgage	87	a	89
New Jersey, United Canal & Railway	97	a	98
Northern Pacific 1st Mortgage land grant bonds	78	a	82
Oregon & California 1st mortgage scrip	35	a	45
Panama general mortgage	91	a	93
Paris & Decatur £100 gold bonds	85	a	97
Pennsylvania $50 shares	44½	a	45½
Pennsylvania 1st mortgage	80	a	83
Pennsylvania 2d mortgage	97	a	99
Pennsylvania general mortgage	99	a	100
Philadelphia & Erie 1st mortgage (guaranteed by Pennsylvania Railroad)	95	a	97
Philadelphia & Erie 1st mortgage, with option to be paid in Philadelphia	95	a	97
Philadelphia & Erie general mortgage (guaranteed by Pennsylvania Railroad)	90	a	91
Philadelphia & Reading $50 shares	45	a	47
Philadelphia & Reading General Consolidated Mortgage	99	a	100
Union Pacific Land Grant 1st Mortgage Bonds	60	a	63
Union Pacific Railway, Omaha Bridge	90	a	92

FRANKFORT.

7 p. c. Buffalo, New York & Philadelphia	62¾
7 p. c. Cairo & Vincennes	69¾
6 p. c. California & Oregon	72
6 p. c. Central Pacific, 1st mortgage	83
6 p. c. Central Pacific (San Joaquin)	72¼
7 p. c. Grand Rapids & Indiana	89⅝
7 p. c. Kansas Pacific	76¾
6 p. c. Lexington & St. Louis	55½
6 p. c. Missouri Pacific	68
6 p. c. Missouri Pacific (South Branch)	61
7 p. c. Mobile & Ohio	81¾
7 p. c. Montclair	77¾
7 p. c. Morris & Essex (currency)	77½
7 p. c. New York & Oswego Midland	75½
7 p. c Oregon & California, 1st mortgage	30
3½ p. c. Rockford, Rock Island & St. Louis	28¾
7 p. c. St. Louis & Southeastern	62¾
8 p. c. Stockton & Copperopolis	67½
6 p. c. Union Pacific (Eastern Division)	67¼
8 p. c. Union Pacific (Omaha Bridge)	84¼

AMSTERDAM.

7 p. c. Atchison, Topeka & Santa Fe	71
7 p. c. Cairo & St. Louis	75
7 p. c. Chesapeake & Ohio	68
Preferred stock Chicago & Northwestern	72¼
7 p. c. bonds Madison Ex	82½
7 p. c. bonds Menominee Ex	80¼
7 p. c. Chicago & Southwestern	75
7 p. c. Atchison Branch, Chicago & Southwestern	43
7 p. c. Cleveland, Mount Vernon & Delaware	87½
7 p. c. Denver & Rio Grande	64
8 p. c. Des Moines Valley	37
8 p. c. Elizabethtown & Paducah	74
8 p. c. Iowa Midland	86
7 p. c. Marietta & Pittsburgh	70½
7 p. c. Minneapolis & St. Louis	64
7 p. c. Missouri, Kansas & Texas	72½
7 p. c. North Missouri, first mortgage	76⅝
7 p. c. Northwestern Union	88⅝
7 p. c. Paducah & Memphis	62
7 p. c. Port Royal	55½
7 p. c. West Wisconsin	68

There have been great fluctuations recently in the prices o some of these securities, and we see a difference of ten points in the quotations for different days of the same week; but transactions have been so small that perhaps the quotations are hardly to be depended upon as an index to the true condition of the market.

Besides these we see Berlin quotations of 30 for Fort Wayne, Muncie & Cincinnati, 38 for Peninsular of Michigan, 24½ for Brunswick & Albany and 40 for Alabama & Chattanooga.

The Press and Free Passes.

The Chicago *Tribune* has recently published editorials denouncing the practice of granting free passes, and these have called out several expressions of opinion which show that it is not alone among newspapers in its opinions. Commenting on a paragraph in the Chicago *Tribune* regarding the danger that law-makers may be prejudiced in their action by the favors which they receive from railroad companies, the New York *Tribune* says:

"Equally true is it that a journalist who has his pockets full of railroad passes cannot be depended upon for impartial exposures of, and fearless attacks upon railroad corruptions. There is no reason why a newspaper man should ride free when other men pay, and one of the best and most cheering signs of the progress of independent journalism is the spread of this belief among journalists everywhere."

This is true; and it is altogether desirable that the railroads, like everything else, be subjected to impartial criticism. To be sure, most newspapers do not hesitate to accept passes on railroads and abuse them at the same time, but they should have no possible motive to refrain from criticism.

The St. Louis *Democrat* says:

"The proposition of the Chicago railroad men is a good one, but it is only a bucket-full out of the vast ocean of deadheadism which needs to be bailed dry. The process is a difficult as well as an extensive one. It will carry mourning to brave hearts and tears to manly eyes; but in the end the good accomplished in the abstract will atone for the grief inflicted in the concrete. Down with the dead-beats!"

The Chicago *Tribune* has also extracts from four country papers, the Logansport (Ind.) *Pharos*, the Genoese (Ill.) *Republic*, the Woodstock (Ill.) *Sentinel*, and the McGregor (Iowa) *Times*, indorsing its position; which is more creditable to these papers, probably, than to the great newspapers; for the passes given to a country newspaper often form no inconsiderable part of its income, its profits being usually very small, and its publication maintained often for the sake of political influence or other advantages than the money profits, among which this privilege of obtaining free passes is not the least. It cannot be expected that journals of this class will refuse to avail themselves of this privilege so long as the railroad companies grant it; and, indeed, often a publisher would put himself at a considerable disadvantage compared with a rival, should he refuse to use this privilege, however much he may feel that he ought not to use it. The reform will never be made if it is left for the recipients of free passes to make it.

The Master Car Builders' Convention.

A meeting of merchants, railroad supply dealers and others was held at the American House, Boston, May 28, to make arrangements for the reception of the Master Car Builders' Association. H. C. Sherburne, of Sherburne & Co., presided, and H. F. Knowles, of the Boston Car Spring Company, was Secretary. An Executive Committee, consisting of the following gentlemen, was appointed: Silas H. Munson, Chas. S. Knowles, John A. Pingree, J. F. Hudson, Robert London, Henry A. Leach, Thomas C. Lothrop, F. A. Howard, Philip S. Page, Edmund C. Perkins and Henry C. Sherburne. Mr. E. C. Perkins, of the Nashua Iron & Steel Company, was chosen T easurer of the committee. A visit to the Hoosac Tunnel, an excursion in the harbor and a banquet are proposed as part of the programme of reception.

The convention will be held on the 11th, 12th and 13th of June—Wednesday, Thursday and Friday of next week.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE has information of the laying of track on new railroads, as follows:

Milwaukee & Northern.—Extended from Forest Junction northward 17⅓ miles to Depere, Wis. *Northwestern Union.*—Extended from a point 3½ miles south of Fond du Lac, southeastward 16⅓ miles to Kewaskum, Wis. *Texas & Pacific.*—Extended on the Dallas end from Eastport eastward 7 miles to Terrell, Kaufman County, Texas, 35 miles east of Dallas; also on the Longview end, westward 25 miles to a point 100 miles west of Shreveport—in all, 32 miles. *Chicago & Paducah.*—Track is laid from Fairbury, Ill., southward 8 miles. *Cairo & Fulton.*—Extended from the recent terminus, 7 miles southwest of Little Rock, southwestward 17 miles to Benton, Ark.

This is a total of 91 miles of new railroad.

THE PACIFIC MAIL STEAMSHIP COMPANY, whose mission it is to "maintain the honor of the American flag in foreign ports," and has that patriotic task pretty much to itself, revolutionized its management at its election last week, as indeed it did a year ago. Mr. Bradbury, the new President, was formerly a captain of one of the company's vessels. Of the new directors, Trenor W. Park is of Bennington, Vt., and the largest stockholder in the new Central Vermont Railroad Company; John M. Burke and George S. Scott are directors in the Rock Island and the Northwestern railroad companies; Russell Sage is Vice-President and probably the controlling manager of the Milwaukee & St. Paul Company; Rufus Hatch was one of the early managers of the Northwestern. Altogether, the board represents a vast deal of wealth and a very powerful interest in Wall street. It is said to be the choice of Jay Gould, who is supposed to control a large proportion of the shares. The late President, Mr. A. B. Stockwell, is supposed to have no longer any power in the company, which can hardly be said to have thriven during his administration. The report, if it can be called such, made by the retiring administration gives as assets $1,373,201.85 in "cash and call loans, United States 5 per cent. bonds, and cash with agents," which may be worth more or less; $3,841,448.26 in Panama Railroad shares, California Dry Dock shares, coal (reckoned at nearly $15 per ton), outfits and supplies, and bills receivable, the latter amounting to $840,000; $2,364,930.13 for payments on steamers building; $2,009,831.77 for real estate at New York, Aspinwall, various points along the Pacific coast, and in China and Japan; $11,651,592.38 for steamers; and sundry smaller items, making up a total of $20,363,008.55. Receipts are given for the years ending with April, for 1871 and 1873, as follows, Central American and California coast lines not being included:

Year ending May 1, 1871.		Year ending May 1, 1873.	
Passengers	$1,790.917 11	Passengers	$1,8 0,710 71
Freight	1,894,790 18	Freight	3,022,194 29
Total	$3,685,707 29	Total	$4,822,904 93

No statement of expenses is given.

The company has under contract two iron steamers, of about 5,000 tons each, for the China line; four iron steamers, of about 3,000 tons each, for the New York and San Francisco line, and two iron steamers, of about 1,500 tons each, for the Central American & Mexican line. The total cost of these eight steamers will be $4.500,000, of which $2,472,930 has been paid.

The stock opened the day of the election at 41⅛, went up to 44¼, and since has been below 39.

ACCIDENTS ON PRUSSIAN RAILROADS are considered in statistical returns compiled from official documents by the government at Berlin. The last, recently published, containing the reports for 1871, gives tables of accidents for ten years, beginning with 1862. During that period the mileage (English) increased from 4,060 to 8,280, and the number of accidents for the whole period was 4,788. This is an average of 479 per year; but more than three-fourths of the whole number were in the first six years of the period, having increased from 513 in 1862 to 912 in 1867. Since the latter year there has been a great decrease, and in 1871 there were only 246, and that with twice the mileage of 1862. This is certainly very encouraging progress, as we may believe that there has been an increase in the average train service as well as in mileage, and the habits of the nation and its government make it improbable that the accidents are reported more imperfectly now than heretofore.

Of the total number of accidents in the ten years, 3,109 were caused by defects or failures of rolling stock—breaking down of cars and locomotives; 662 by inattention to signals and switches misplaced in consequence; 272 to obstacles on the rails, placed maliciously or by accident; 251 to "atmospheric influences;" 187 to defects or failures of permanent way, and 307 to unknown or unexplained causes.

The results of these accidents were comparatively slight, only 20 persons having been killed and 112 injured; 271 locomotives and cars having been badly damaged and 398 slightly.

THE LUMBER TRAFFIC has long monopolized a large share of the vessels on the Great Lakes, and latterly the grain-growers have felt that they needed all there are. An attempt to transport the lumber across Lake Michigan in rafts, and thus obviate the necessity of using any other vessels than tugs, has therefore a considerable interest to others than those engaged in the lumber trade. Lake rafts are not altogether novel; but heretofore they have been moved comparatively short distances, chiefly from the mouths of streams on Lake Huron and Saginaw Bay to mills in the vicinity. Now some Chicago firms have made preparations to test very thoroughly the practicability of towing rafts of logs across Lake Michigan to Chicago, there to be manufactured. The danger is that the rafts may be broken up and lost in the heavy storms to which they will be exposed, and for rafts of the shorter logs this is a great danger. Very long logs may make more seaworthy rafts, but if the traffic is to be confined to these, not much will be saved. To balance the saving of vessel room we must set the slow progress of a raft and the necessity of using steam instead of sails.

STATE MANAGEMENT IN MASSACHUSETTS seemed fairly victorious in the lower house of the Legislature on the 28th ult., when on a motion for the engrossment of the pending bill, which was supposed to unite in opposition all the enemies of State management, the motion was passed by a vote of 109 to 106. But the next day a vote for a reconsideration was carried by 109 to 99—five members who voted for the engrossment having voted for reconsideration; and thereupon by a nearly unanimous vote a substitute was passed simply appropriating $200,000 to put the Hoosac Tunnel in order and make surveys which will enable the Governor and Council to report to the next Legislature some plan for utilizing the tunnel to the best advantage.

It is supposed that a considerable majority of the Senate is in favor of State management; and it is not impossible that this branch of the Legislature may pass the bill which the lower house has just rejected, in which case it will again come before the latter for its action; and with so close a vote as that reported, one day in favor of and the other against the bill, it is not impossible that it might again reverse its action and indorse the bill, should it come from the Senate passed by a large majority. It is more probable, however, that nothing will be done at this session toward disposing of the question finally.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

Gunpowder Pile-drivers—Rail Economy.

A regular meeting of this society was held at the rooms in New York, March 5, 1873.

A paper on "Shaw's Gunpowder Pile-driver," by Samuel R. Probasco, C. E., of Brooklyn, N. Y., was read.

This piledriver was set at work in October, 1872, on a line of sheet piles for a reservoir dam in the valley of Parsonage Creek, Long Island. The material to be penetrated was sand and fine gravel, cemented together in places so as to be hard and difficult to move with a pick, and like "hard-pan." Clay was found below the water-level of the basin; some borings showing it at 15 feet below the surface. The lower stratum was tough and tenacious, and the whole material was under water.

The machine in form resembles an ordinary pile driver: a cast-iron block, called a "gun," resting on the head of the pile, is bored out, and receives without windage a wrought-iron piston attached to another cast-iron block, called the "ram," which is lifted by explosion of powder in the bore. When the piston leaves the gun, a cartridge is thrown in which, exploded by the heat freed by the piston in its descent, throws the ram upward again and forces the pile downward. The area of the piston is adjusted to the weight of the ram, which also is adjusted to the work to be done. Soda powder cartridges in cylinders of 1¼ to 1½ ounce, coated with black lead and paraffine are used. The coating is expected to keep the powder dry, lubricate the gun, preserve the requisite tightness, prevent escape of gas, and cause the entire force to be exerted on the base of the piston.

The piston is made a little smaller than the bore of the gun, and has on the lower end a steel ring which fits the bore closely.

The performance was as follows:

At first several explosions were necessary to lubricate the gun, which leaked gas so that the ram would not go to the requisite height to move the pile. After a few shots, the piston moved up regularly, and in its descent fired the charge, forcing the pile down and itself upward. When the resistance is slight, this machine may be economical, but when, as in this case, it required 300 blows from cartridges costing 2½ cents each to force a pile down 15 or 16 feet, it cannot be called so. The gas from the explosions cut passages in the ring at the end of the piston, and thereby much lessened the power of the machine. The gun became hot from the rapid discharges, and the bore enlarged, whereby more gas escaped. Seven piles were driven with it—each costing more for powder than the contractor got for piles in place—when the machine refused to work. On examination, the steel ring was found furrowed by the powder, and the piston (diameter, 5 inches) so bent by striking the bottom of the gun as to be useless. The air-cushion relied upon to prevent this was lost by the furrowing of the ring. The inventor, on being consulted, decided that the excessive consumption of powder was due to the piston being too small for the ram, weighing over 1,700 lbs. The bore of the gun was then enlarged to receive a piston seven inches in diameter, and 10 piles more were driven, when the machine was again laid aside. The result of this trial was similar to the first, except that the piston was not bent. The gun got so hot as to fire the powder before the ram reached its place. Altogether 17 piles were driven to a depth of from 14 to 19 feet, requiring from 200 to 300 blows of 1½ oz. cartridges.

An ordinary piledriver was then employed, with a hammer weighing 1,800 lbs. and falling 8 to 10 feet. In this way 11 piles were put down 15½ feet in ten hours, costing per pile no more than 100 blows from the powder machine. These 100 blows, at best, would put the pile down but 10 feet.

The piling was spruce, from 10 x 10in. to 10 x 14in., 20 feet long, with 2in. square tongue and groove. The piles were beveled at the point on three sides, leaving the grooved side untouched. The groove was driven on the tongue of the preceding pile. The heads were protected with a light band.

Seven piles were driven without shoeing; the eighth split and showed the necessity of protection at the point. A cast-iron cup shoe, weighing about 40 lbs., with a groove in it, and made with three bevels and one plain side, was found to stand the work. The tendency of the tongue of the pile to work up was obviated by twisting a chain tightly about the pile and tongue; a lever with rope attached was used for this purpose, the force being applied as the blow was delivered. Seventy-five piles were driven in this way to a mean depth of 15½ feet. By experience six inches more depth has been attained, which is about the maximum penetration in this kind of material, and this can only be done with the best of sound, dry spruce.

RAIL ECONOMY.

A brief discussion followed, after which a paper on "Rail Economy," by C. P. Sandberg, C. E., of London, England, in reply to the discussion had upon a former paper of his on the same subject, was read.

In that discussion it had been remarked, under the head of "Traffic Capacity," that the weight on locomotive driving wheels, stated therein, differed from American practice; that on the Philadelphia & Reading Railroad, four tons on drivers were not exceeded for a 64-lb. rail, and that on the Erie Railway 5½ tons had been found too much for a 70-lb. rail.

Mr. Sandberg herein replied that it would be interesting to know what weight the rail and the rail joint would carry in the two instances mentioned; 6¼ tons on drivers on a 60-lb. rail, as stated in the table, and considered excessive, might not be so; the table showed that the 60-lb. rail of standard section with fish-plate would carry 14 tons in the middle between three-feet bearings, and 9¼ tons at the joint between two-feet bearings. According to the table, the maximum load on drivers on standard sections was one-third what the rail in the middle would carry, and two-thirds of what the the rail-joint would sustain. In order to obtain the full value of the material the joint ought to be as stiff as the middle of the rail. For this it is best to use the fish-plate as thick as will not interfere with the tire-flange; the angle should be as small as will permit an easy rolling of the rail. This angle is 11 deg. and 15 deg., the latter for light rails, experiments having proved that the smaller the angle the stiffer the joint. With this fishing the capacity of the rail at the joint is two-thirds that at the middle, while with ordinary fastening it is but one-fourth. In regard to the Erie sections, experiments have shown that this rail will bear at the joint but two tons, while at the middle it will carry ten tons, hence it is not strange that five and a half tons on the drivers proved disastrous. The necessity of a sufficient thickness in the fish-plates is often overlooked. It is doubtless prudent to increase the number of drivers on American roads, but the statement that six and a quarter tons on a sixty-pound standard rail section with standard fastenings is excessive, should be modified. This load is not the most economical for working a line, but that to which an increase of traffic might extend. Many European railways with a seventy-pound section have a joint carrying only six tons, owing to too large an angle and too thin a fish-plate.

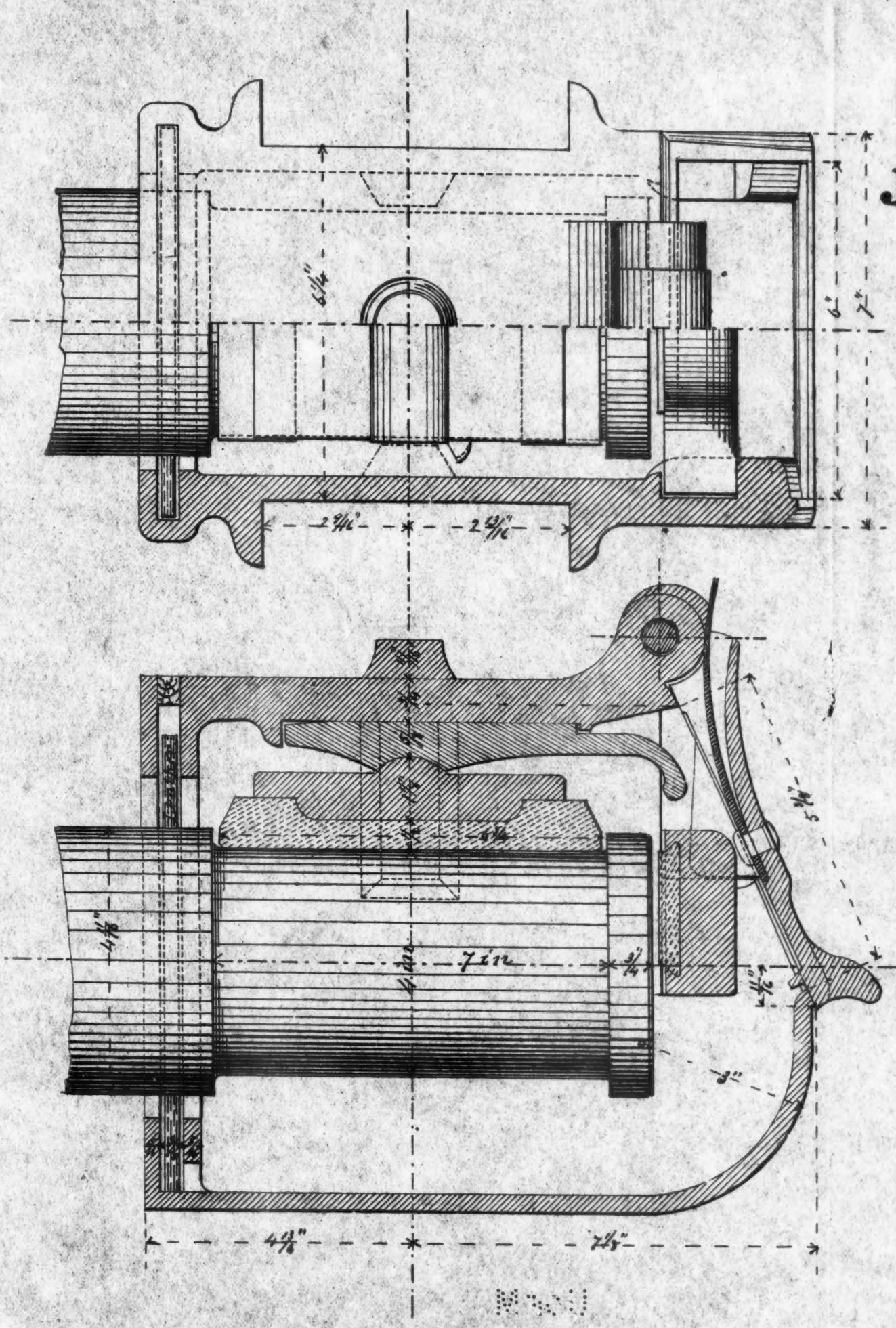
Production of Rails in the United States.

The following is from the Bulletin of the American Iron and Steel Association:

The total number of net tons of rails made in the United States in 1872, as reported to the office of the American Iron and Steel Association by the makers, is 941,992, or 841,064 gross tons. This aggregate was produced in the following States, the production of each of which in 1872 is given in comparison with the production in 1871:

	1872.	1871.
Pennsylvania	419.529	335,604
Ohio	121,923	75,782
Illinois	106,916	91,178
New York	82,457	87,022
Wisconsin	37,284	28,774
Massachusetts	29,242	28,864
Maryland	26,472	44,941
Indiana	23,893	12,778
West Virginia	20,100	5,000
Missouri	15,500	8,200
Tennessee	14,620	9,667
Maine	14,058	13,383
Michigan	9,883	14,000
New Jersey	9,185	6,700
Georgia	6,930	7,840
Kentucky	4,000	6,000
Total	941,992	775,733

This aggregate of production includes only such rails as

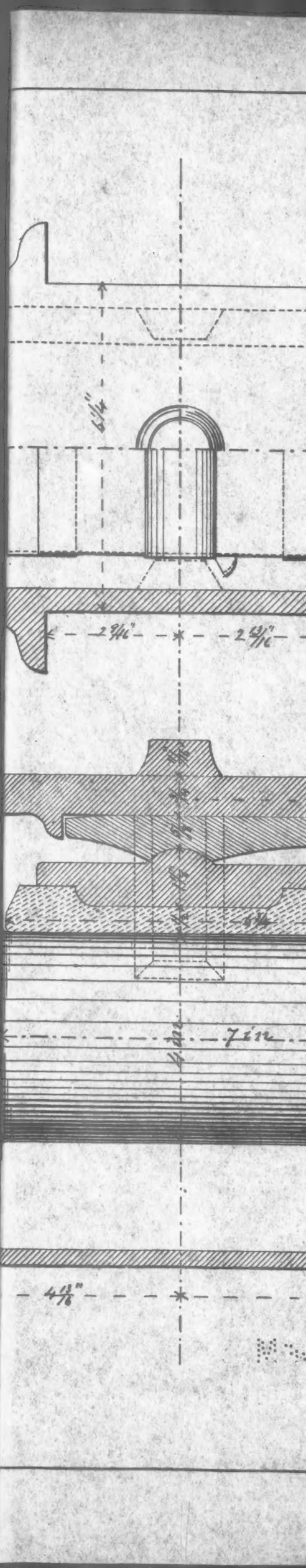


JOURNAL

PASSE

ERIE

C.A. Smith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JOURNAL-BEARING AND BOX

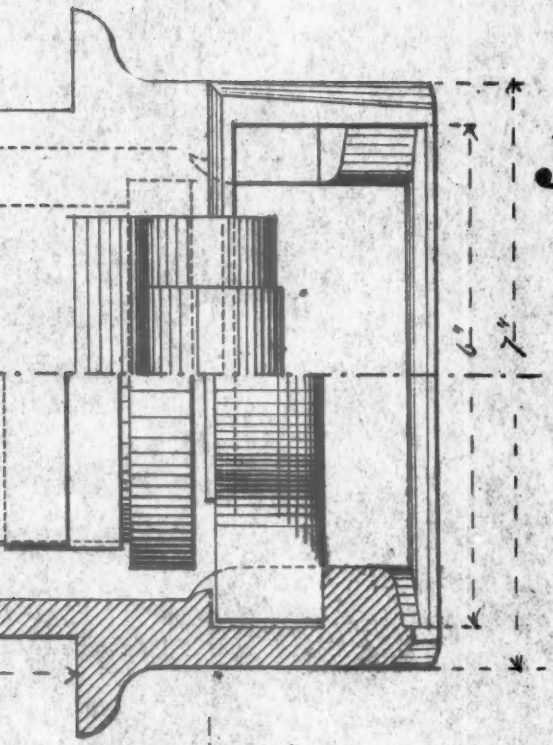
FOR

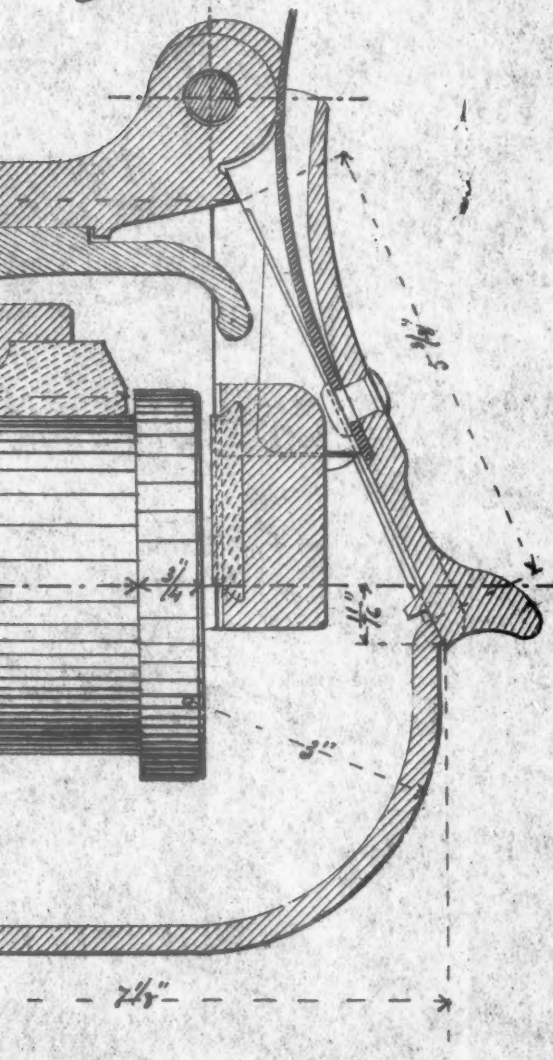
PASSENGER CARS

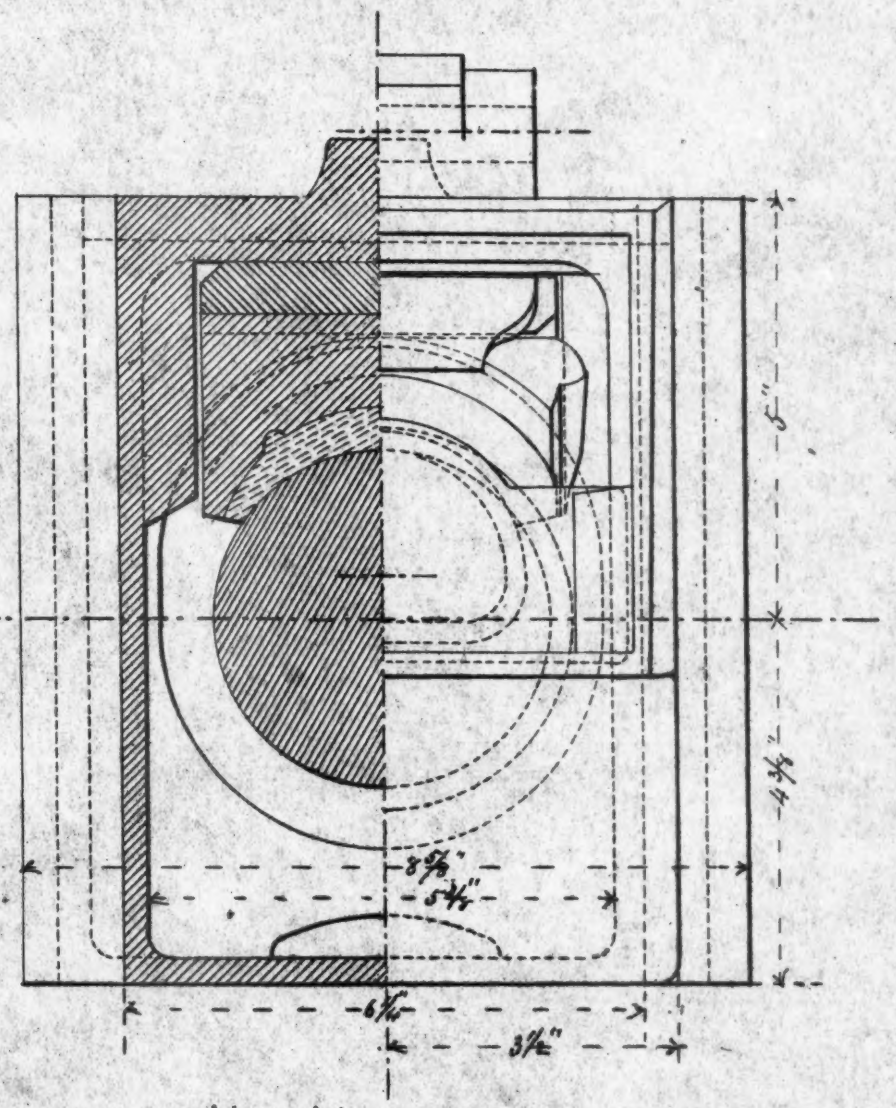
ERIE RAILROAD.

C.A.Smith, Master Car Builder.

Scale: Half Size.







were made for the use of freight and passenger railways, and excludes 15,000 tons of street rails and all mining rails made during the year. More mining rails are made by bar-mills than by rail-mills, and they are generally classified as bar-iron; hence the impossibility of ascertaining exactly the production of this class of rails in any year. Were the fact otherwise, however, we but follow the precedent of this office in excluding from our statistics of rails any estimate of the production of mining rails, as well as the ascertained production of street rails.

By this table it will be observed that in 1872 Pennsylvania made 419,529 tons, or 44½ per cent. of the whole. Ohio comes second in the list, taking the place which Illinois held in 1871. Illinois is the third State in the list, and New York the fourth. In the production of steel rails the relative position of these four great iron-producing States is almost the same, Pennsylvania producing 38,463 tons; Ohio, 22,000 tons; Illinois, 15,930 tons; and New York, 17,677 tons. No other States made Bessemer rails in 1872. The largest production of both iron and steel rails by a single mill must be credited to the Cambria Iron Works, at Johnstown, Pa., which made a total of 81,006 net tons. This magnificent result was accomplished during a year in which the larger part of the works was destroyed by a a fire—a calamity which it is proper to state, however, was almost immediately overcome by the extraordinary energy and resources of the company.

The following table exhibits the growth of the home production, importation and consumption of rails in the United States from 1849 to 1872, inclusive, together with the growth of the railway system of the country during the same period:

YEARS.	Total rails made in the United States. Tons of 2,000 lbs.	Total rails imported. Tons of 2,000 lbs.	Total consumption of iron and steel rails.	Miles of railroad built in United States in each year.
1849	24,318	69,163	93,481	1,369
1850	44,083	159,000	203,163	1,656
1851	50,693	226,350	276,953	1,961
1852	62,478	294,750	357,228	1,926
1853	87,864	358,794	446,658	2,452
1854	108,016	339,439	447,455	1,360
1855	138,674	153,019	291,693	1,654
1856	180,018	186,594	366,612	3,643
1857	161,918	215,166	377,084	2,491
1858	163,712	90,804	254,606	2,460
1859	195,454	83,958	279 412	1,821
1860	205,038	146,610	351,648	1,846
1861	187,818	89,388	277,206	621
1862	213,912	10.186	224,098	864
1863	275,768	20,506	296,274	1,050
1864	335,369	142,457	477,826	738
1865	356,232	63,327	419,619	1,377
1866	430,778	117,878	548,656	1,832
1867	462,108	184,840	646,948	2,227
1868	506,714	300,160	806,874	3,033
1869	593,586	346,500	931,086	4,977
1870	620,000	472,403	1,092,403	6,145
1871	775,733	566,202	1,341,935	7,453
1872	941,992	530,850	1,472,842	6,043

The production of rails in 1871 in the United States was 775,733 net tons; in 1872 it was 941,992 tons. Increase, 166,259 tons, or 21½ per cent. The importation of foreign rails in 1871 was 566,202 net tons; in 1872 it was 530,850 tons. Decrease, 35,352 tons, or 6¼ per cent. The net gain of the American railmaker in 1872 over his foreign rival was, therefore, 201,611 net tons.

Of the total production of 941,992 net tons of rails in 1872, 94,070 tons were Bessemer steel rails. In 1871 there were produced 60,042 net tons of steel and steel-headed rails. Increase, 34,028 tons, or 56⅔ per cent. Of the 530,850 net tons of rails imported in 1872, 149,786 tons were steel rails. In 1871 it is estimated that there were imported 83,887 net tons of steel rails. Increase, 65,889 tons, or 78½ per cent.

It will be seen that, while the importation of rails of all kinds was 35,352 net tons less in 1872 that in 1871, the importation of steel rails increased 65,889 tons. The reduction in the importation of all iron rails was, therefore, 101,241 tons.

The total consumption of iron and steel rails in 1871 was 1,341,935 net tons; in 1872 it was 1,472,842 tons. Increase, 130,907 tons. This increased consumption was more than equaled by the increased production of American mills, which was 166,259 tons, as above stated.

The importation in 1872 of old rails for remanufacture is carefully estimated at 170,000 gross tons. The customs regulations do not separate old rails from scrap iron; hence the necessity of estimating the quantity of each imported. The total importation of old scrap iron in 1872 was 248,444 gross tons, valued at $7,617,463, gold, of which Great Britain sent 108,181 tons, valued at $3,203,746. In 1871 Great Britain sent us 139,812 tons, valued at $3,255,349.

During the year ended December 31, 1872, the aggregate value of the imports of iron and steel and manufactures thereof, as officially reported to this office by the Hon. Edward Young, Chief of the Bureau of Statistics, Treasury Department, was $60,575,514, gold, of which $22,705,025 represents the value of new iron and steel railroad bars—$14,498,012 of iron, and $8,207,013 of steel.

During the ten months ended October 31, 1871, the exports from the United States of American railroad bars and rails was 330 net tons; during the same period of 1872 the export was 746 tons. Increase, 126 per cent. These figures of our export trade are comparatively unimportant, but they show progress in the right direction.

The Illinois Central Meeting.

The Illinois Central Company has published the proceedings of the meeting for the election of directors held in Chicago on the 28th ult. By this it appears that 167,087 shares were represented at the meeting, which were voted as follows: 73,202 by John Newell, 50,424 by W. K. Ackerman, 42,226 by Richard H. Glyn, 830 by J. N. Jewitt, and 405 by Lucien Tilton.

The minutes of the meetings of the directors since the previous annual election were submitted and approved; resolutions were passed ratifying and approving all the acts of the board, approving the President's annual report, and confirming the agreements made with the New Orleans, Jackson & Great Northern and the Mississippi Central companies for the extension of the latter road to Cairo—and concerning the latter the following was unanimously adopted:

"*Whereas*, The early completion of this line to New Orleans is a work of great necessity, and

"*Whereas*, It is believed to be the best means for an outlet for the surplus products controlled by the Illinois Central lines;

"Therefore this meeting recommends even more decided measures to secure all the funds necessary for its early completion, and this meeting believes that this purpose will be best attained by extending to 30 years the present agreement, on the part of the Illinois Central Railroad Company, to purchase at a price not exceeding par from the six millions of bonds issued by the above named two companies, to an extent not less than $200,000 for each year, which substitution is recommended by this meeting."

A resolution was passed approving the increase of capital stock, the plan of submitting it to the annual meeting, and instructing the board to pursue a similar course in case it should hereafter deem expedient a further increase of stock. The board was authorized to call a special meeting of stockholders at any time by giving 90 days notice in a daily commercial paper in each of the cities of Chicago, New York, London and Amsterdam.

George Bliss, Lucien Tilton and W. K. Ackerman, whose terms had expired, were re-elected directors for the term of four years, and L. V. F. Randolph was chosen to fill the unexpired term (for three years) of A. S. Hewitt, resigned, all by the unanimous vote of all the shares represented.

In connection with the report of the proceedings of this meeting, the President of the company submitted the following interesting statement:

Your property comprises 705½ miles of main track, and 127 miles of sidings and double track, 197 locomotives, 4,772 freight and passenger cars.

With the exception of 2,810 feet of wooden bridges to be replaced with iron, all the bridges and culverts are of masonry and iron.

The right of way on the major part of the line is 200 feet in width.

The station property now enclosed at Chicago upon the lake shore embraces fifty acres.

Generally, at other stations, all the land required in advance of any possible want for many years is secured.

There is no engagement with any car association, either freight or passenger, for using the lines of this company. It has adhered to the policy of building and owning the entire rolling stock.

The engagement with other companies are: First, annual payment of $75,000 per annum, for the use of part of the Toledo, Peoria & Warsaw Railway line, between our main line and branch, which contract is a source of profit. It expires in about six years.

The lease of the line from Dubuque to Sioux City, 326.58 miles, was for twenty years; by the payment of 35 per cent. for ten years, and 36 per cent. for ten years, upon the gross traffic received upon that line.

The Dubuque & Sioux City Company had leased the Cedar Falls & Minnesota road, agreeing to pay $1,500 per mile per annum for its use, which was assumed. This road is 75.58 miles in length.

This company has engagements to devote from 15 to 25 per cent. of the gross traffic derived from several connecting lines to the purchase of their bonds.

These obligations are of trifling importance, with the exception of the engagement made with the railway from Cairo to New Orleans, now under construction. To secure this important connection, the directors authorized setting aside 25 per cent. of the gross receipts, devoting it to the purchase of the bonds of the two southern companies, agreeing to accept tender at not exceeding par for at least one hundred bonds of each company each year.

Our traffic to and from the South is growing in importance. Last year the business exceeded $1,000,000. With the direct railway connection we may look for a large increase upon this traffic at an early period.

The total outlays as shown in the general balance sheet of 31st December last were	$34,224,092 06
The working stock of supplies	745,961 68
Making	$34,970,053 74

To which should be added the loss of interest paid during the construction of the road, and until the earnings exceeded the interest charge, $3,576,302.37, making $38,546,356.11.

The directors have ordered $290,000 to be added to the sum of $2,761,500 now in the "sinking fund," which, with the interest to accrue before the maturity of the bonds, will discharge the construction mortgage debt.

With this adjustment the $38,546,356.11 is represented by

Redemption bonds due 1st April, 1875	$3,500,000 00
Redemption 6 per cent. currency bonds, due 1st April, 1890	2,500,000 00
And stock	25,500,000 00
Making an aggregate of	$30,500,000 00

Which is $8,000,000 less than the cost of the property.

The company held, January 1, obligations for $1,472,562.15 on contracts for lands sold, and had 344,368 acres of land for sale.

The original engagement with the State of Illinois stipulated that, at the expiration of ten years after the completion of the line, the unsold land should be offered at public sale. The company considers that it has fully complied with this requirement; but in view of the feeling entertained in the State, and the recent action of its Legislature, it is desirable to close out these lands, even at a sacrifice, to avoid any difference with the State authorities upon this subject. Pending negotiations for about 300,000 acres of this land will probably be concluded upon terms which will aid in providing for the redemption bonds due in 1875.

The President has the satisfaction to express to the shareholders the belief that the causes which led to so large a diminution in net results of the operation of the road last year are gradually being remedied, and that the efforts making by the trunk lines leading to the East to accommodate a larger traffic, with a better present supply of vessels upon the lakes, have already produced higher prices for grain at Chicago, and that the benefit to be derived from the New Orleans line will doubtless commence early in the autumn. Thus we may look for an increasing traffic during the remaining months of this year.

In this connection it may not be superfluous to state, in view of the alarm which has disturbed the minds of many railway shareholders by the unexpected transfer of the management and control of several railway properties in this country, that upwards of nine-tenths of our capital stock is registered in the names of investors, and that the number of shareholders has so largely increased that the control of this property can only be obtained by actual purchase. It is desirable that the shareholders should renew their proxies each year, and give specific instructions if a change in the board of directors is desired.

The Union Rolling Mill of Chicago turns out 120 tons of rails per day, or about 36,000 tons per year. The rolling-mill building of the company is 280x200 in size, and contains three double puddling and eleven heating furnaces, with one blooming train of rolls for reducing the ingots of steel to blooms, one rail train for rolling T rails, and one puddle train for the rolling of muck bars. In this mill both steel and iron rails are made, the mill running for two weeks on each alternately. The building for the manufacture of Bessemer steel is 150 by 100, and contains two five-ton converters, four cupola furnaces, and two reverberatory furnaces for melting the spiegel. The machinery of the establishment is driven by five engines, two of which are of 500 horse-power each, the steam of which is generated in 12 boilers, 40 feet long and 40 inches in diameter; the other three are of 45 horse-power each, and are used in the rolling mill alone. The company employs 600 men in its operations.

The Helmbacher Mills at St. Louis employ about 240 men and turn out from 100 to 150 car axles per day, besides other heavy forgings and steamboat work. The sales for the year 1872 amounted to about $650,000.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—Mr. Henry Strong, of Chicago, has been elected President of the Atchison, Topeka & Santa Fe Railroad Company, in place of Ginery Twichell, of Boston; Thomas Nickerson, of Boston, Vice-President, in place of Mr. Burr, of the same place; and A. E. Touzalin, Land Commissioner, in place of D. L. Lakin, resigned. Mr. T. J. Peter retires from the office of General Manager.

—At the annual meeting of the Pacific Mail Steamship Company in New York, May 28, the following board of directors was elected: George H. Bradbury, T. W. Park, J. D. Smith, J. M. Burke, C. J. Osborn, Russell Sage, George S. Scott, George H. Palmer, Rufus Hatch. The new board of directors organized by electing officers as follows: President, George H. Bradbury; Vice-President, W. F. G. Bellows; Secretary, Theodore T. Johnson; Treasurer, Henry Smith.

—Mr. Reuben Ragland, President of the Petersburg Railroad Company, has been elected President of the Richmond & Petersburg Company, in place of Col. Thomas H. Wynne, resigned. Colonel Wynne has been chosen General Manager of both companies, whose roads will hereafter be operated as one.

—Mr. George W. French has been appointed General Freight Agent of the Evansville & Crawfordsville Railroad, in place of A. E. Shrader, resigned.

—Mr. George Barrett, Chief Engineer of the Shenandoah Valley Railroad, has resigned his position to accept an appointment as Chief Engineer of the New York, Norfolk & Charleston Railroad.

—At the annual meeting of the Northern Railroad Company of New Hampshire at Concord, N. H., May 29, the following board of directors was elected: Onslow Stearns, Josiah Minot, Concord, N. H.; G. W. Nesmith, Franklin, N. H.; John A. Burnham, Uriel Crocker, Charles F. Choat, Edward Lawrence, Boston. The directors re-elected Hon. Onslow Stearns, President.

—At the annual meeting of the Shenandoah Valley Railroad Company at Front Royal, Va., May 21, the following board of directors was chosen: J. M. Walker, W. L. Boyce, John W. Ashby, Wm. Milnes, Jr., Mann Spitler, W. H. Travers, A. R. Boteler, Thos. B. Kennedy, Wm. McClellan, H. B. Harnsberger, M. B. Buck. The board elected Thomas A. Scott, President.

—At the annual meeting of the Merrimac & Connecticut River Railroad Company at Concord, N. H., May 29, the following board of directors was elected: Onslow Stearns, Josiah Minot, Concord, N. H.; G. W. Nesmith, Franklin, N. H.; Davis Steele, Goffstown, N. H.; John A. Burnham, Uriel Crocker, Boston. The directors subsequently elected Onslow Stearns, President; Charles P. Sanborn, of Concord, Clerk; and Josiah Minot, of Concord, Treasurer.

—At the annual meeting of the Concord & Rochester Railroad Company in Concord, N. H., May 29, the following board of directors was chosen: Nathaniel White, John V. Barron, Benjamin A. Kimball, James R. Hill, John E. Lyon, Onslow Stearns, Ebenezer G. Wallace, Joshua M. Babcock and John H. Pearson.

—Mr. Robert H. Berdell has been elected President, and Artemas Sahler Vice-President of the Wallkill Valley Railroad Company.

At the annual meeting of the Toledo & Southwestern Railroad Company in Toledo, O., May 20, the following were elected directors: Robt. H. Bell, Dr. T. M. Cooke, Toledo, O.; R. B. Mitchell, Maumee City, O.; J. J. Vorhees, Grand Rapids, O.; D. W. H. Howard, Wauseon, O.; J. Hipp, Timberville, O.; Dr. W. W. Longsworth, F. J. Bonnewitz, Van Wert, O.; Dr. M. Oroninger, Wiltshire, O. Dr. T. M. Cooke was re-elected President.

—At the annual meeting of the Northern Central Railroad Company of Michigan, at Albion, Mich., May 28, the following directors were chosen: Horace F. Clark, Augustus Schell, James H. Banker, New York; E. B. Worcester, Albany, N. Y.; Amasa Stone, Jr., Henry B. Paine, Cleveland, O.; Samuel V. Irwin, W. H. Brockway, Albion, Mich.; A. N. Hart, Lansing, Mich.; W. J. Baxter, Jonesville, Mich.

—Mr. H. B. Montgomery, formerly on the Ohio & Mississippi road, and later in the general offices of the Erie Railway, has been appointed Traveling Auditor and Chief Clerk in the Auditor's office of the International & Great Northern Railroad. His address is at Houston, Texas.

—At the regular annual meeting of the stockholders of the Cape Girardeau & State Line Railroad Company, held at the office of the company in Cape Girardeau, Mo., May 17, the following persons were elected directors of the company for the ensuing year: P. R. Van Frank, Sebastian Albert, August Bierwirth, Michael Dittlinger, John Ivers, William B. Wilson, Wm. Buchanan, Thomas Doyle, Joseph Lansmon, G. C. Niebur, L. L. Phillips, Thomas Johnson, L. F. Klostermann. The board of directors organized by electing P. R. Van Frank, President; Michael Dittlinger, Vice-President; Samuel B. Rowe, Secretary; Alexander Ross, Treasurer, and William B. Wilson, John Ivers and P. R. Van Frank, Executive Committee.

—Gen. John Echols has resigned as President of the Louisville, Cincinnati & Lexington Railroad Company, and returns to his law practice at Staunton, Va. J. B. Wilder, of Louisville, has been elected President of the company.

—At the annual meeting of the stockholders of the Illinois Central Railroad Company, in Chicago, May 28, 167,087 shares were represented. George Bliss, of New York, and Lucian Tilton and W. K. Ackerman, of Chicago, were re-elected directors for the term of four years. L. V. F. Randolph, of New York, was elected to fill a vacancy.

—A circular from the President of the New Jersey Southern Railroad Company announces the following changes: Mr. G. W. Bentley having resigned his position as Vice-President and General Manager, that office is abolished. Mr. M. W. Serat has been appointed Superintendent in place of G. W. Sneden, resigned; Mr. John F. Cole, General Freight and Passenger Agent, in place of O. B. Kinne, resigned; Mr. Charles J. Osborne, Treasurer, in place of John F. Cole, appointed General Freight and Passenger Agent; and Mr. G. P. Morosini, Secretary and Auditor. The offices of the Superintendent and General Freight and Passenger Agent are at Long Branch, N. J., and those of the President, Secretary and Treasurer at 30 Broad street, New York. Messrs. Morosini and Serat were formerly in the employ of the Erie.

—Mr. James F. Clark, for many years Roadmaster of the Chicago, Burlington & Quincy Railroad, will soon take charge of the Mountain Division of the Union Pacific Railroad, *vice* P. J. Nichols, who will assume the superintendency of the Eastern Division, with headquarters at Omaha.

—Mr. John Rooney has been chosen President of the Boston, Hartford & Erie Railroad Company (the old company), in place of Frederick A. Lane, resigned.

—At the annual meeting of the Atchison, Topeka & Santa Fe Railroad Company, at Topeka, Kan., May 22, the following board of directors was elected: Ginery Twichell, Thomas Nickerson, Joseph Nickerson, F. H. Peabody, Alden Speare, George B. Wilbur, Isaac T. Burr, B. P. Cheney, Boston, Mass.; George Opdyke, New York; Henry Strong, Chicago; Thomas J. Peter, D. L. Lakin, C. K. Holliday, Topeka, Kan. Messrs. Raymond and Sherbrooke, who declined serving longer, are the only

members of the old board not re-elected. The board elected Henry Strong President and Thomas Nickerson Vice-President, in place of Messrs. Twichell and Burr, who declined a re-election.

—Colonel Robert L. Owens, who was President of the Virginia & Tennessee Railroad Company for several years, died in Norfolk, Va., June 2. Colonel Owens was a civil engineer and in early life was employed on the James River & Kanawha Canal, the Virginia & Tennessee Railroad and other important works.

—Mr. G. P. Morosini, recently appointed Auditor and Secretary of the New Jersey Southern Company, was formerly Auditor of the Erie Railroad. Mr. John F. Cole, the new Passenger and Freight Agent, and Mr. Serat, the new Superintendent of the same road, were also formerly connected with the Erie.

—Governor Beveridge, of Illinois, has appointed Joseph Utley, of Dixon, Morris G. Anderson, of Peoria, and W. N. Brainard, of Chicago, State Canal Commissioners. Mr. Anderson takes the place of Virgil Hickox, and Mr. Brainard, who is Vice-President of the Chicago Board of Trade, that of Robert Milne. Mr. Utley, who is re-appointed, has been a member of the board for the last four years.

—The report that Mr. H. B. Rue has been appointed General Superintendent of the Cayuga Lake Railroad has been contradicted. Mr. Delafield remains Acting Superintendent.

—At the annual meeting of the Hempstead & New York Railroad Company, recently, the following board of directors was elected: Abram Wakeman, H. S. Smith, P. C. Barnum, F. Grosjean, E. T. Hunt, James A. Johnston, Charles Fox, Jacob R. Shipherd, P. H. Gallaudet, Charles H. Dewey, George H. Holt, H. W. Onderdonk and Theo. Wells. The following officers were elected: President, H. J. Smith; Vice-President, George W. Holt; Treasurer and Secretary, Charles H. Dewey. Mr. Dewey is Treasurer of the South Side Company, and Messrs. Shipherd and Fox are directors of that company.

—The stockholders of the East River (New York and Brooklyn) Bridge Company met June 2 and elected the following directors: Henry C. Murphy, Abram S. Hewitt, J. S. T. Stranahan, W. C. Kingsley, A. C. Keeny, William W. Goodrich, Alexander McCue, B. F. Tracy, John H. Prentice, H. H. Wheeler, W. H. Vanderbilt, Frank Moulton, John W. Lewis, Isaac Van Anden, Samuel McLean. At a subsequent meeting of the board, Mr. W. C. Kingsley resigned his position as Superintendent, but no successor was elected.

—At the annual meeting of the New York & Long Island Bridge Company, June 2, the following directors were elected: John L. Brown, John T. Conover, A. M. Bliss, D. L. Pettee, Shepherd F. Knapp, H. W. Genet, J. D. Coleman, George Wilkes, A. W. Winants, P. L. Tyler, Jacob M. Long, Stephen C. Walker, H. J. Livingston, H. Vandewater, W. C. Conner, Joel A. Fithian, Cornelius Corson, G. L. Knapp, E. J. Shandley, R. M. C. Graham, Charles Johnson.

—At the annual meeting of the Manchester & Keene Railroad Company at Keene, N. H., recently, the following board of directors was chosen: Henry Colony, Samuel W. Hale, George B. Twitchell, Jason French, Keene, N. H.; Ezekiel A. Straw, Manchester, N. H.; Daniel W. Tenney, Marlboro, N. H.; Milan Harris, Harrisville, N. H.; A. H. Dunlap, Theodore H. Wood, Nashua, N. H.; Ansel Dickerson, Winchester, N. H.; George L. Foote, Boston, Mass. Thomas E. Hatch, of Keene, N. H., was chosen Clerk, and Gen. Simon G. Griffin, of Keene, N. H., Treasurer.

—At the annual meeting of the Hudson Suspension Bridge & New England Railway Company in New York, June 2, the following board of directors was chosen: James R. McBeth, John Q. Hoyt, E. W. Serrell, A. S. Diven, Dewitt C. Littlejohn, L. J. Guthrie, Charles J. Fusey, Hiram Barney, A. W. Humphries, J. H. Jackson, Benjamin E. Smith, E. R. Wiswell, C. R. Griggs.

—At the annual meeting of the St. Paul, Stillwater & Taylor's Falls Railroad Company at St. Paul, recently, the following board of directors was elected: Peter Berkey, A. H. Wilder, J. L. Merriam, A. H. Baldwin, Isaac Staples, A. B. Stickney, Horace Thompson, E. F. Drake, Wm. Crooks, W. B. Dean, S. F. Hersey, M. Auerbach, Russell Blakeley.

—Mr. R. J. Cavett has been appointed Superintendent of the Carbondale & Shawneetown Railroad, in place of W. P. Hanchett.

—Mr. James R. Faulkner, formerly Superintendent of the Harlem Extension Railroad, and late Superintendent of the Brazos Division of the International & Great Northern Railroad of Texas, has been appointed Superintendent of the Houston Division of the same road, and Assistant Superintendent of the line. Mr. Faulkner's headquarters are at Palestine, Texas.

—Mr. A. E. Shrader, late of the Evansville & Crawfordsville Railroad, has been appointed General Freight Agent of the St. Louis & Southeastern Railway, with office at Evansville, Ind., in place of John W. Mass, resigned.

TRAFFIC AND EARNINGS.

—The earnings of the St. Louis & Southeastern Railway (consolidated) for the third week in May were $28,612.22. The earnings of the St. Louis Division for the same week were: 1873, $16,806.23; 1872, $9,820.79; increase, $6,985.44, or 71½ per cent.

—The earnings of the Kansas Pacific Railway for the third week in May were: passengers, $29,547.75; freight, $45,961.92; mails, $2,055.31; total, $77,564.98. Of this amount $3,570.91 was for transportation of troops, mails and government freight.

—The earnings of the Erie Railway for the week ending May 23 were: 1873, $455,644; 1872, $452,034; increase, $3,610, or 0¾ per cent.

—The earnings of the St. Louis & Iron Mountain Railroad for the second week in May were; 1873, $62,520; 1872, $47,881; increase, $14,639, or 30½ per cent.

—The earnings of the Great Western Railway of Canada for the week ending May 9 were: 1873, £25,585; 1872, £21,965; increase, £3,620, or 16½ per cent.

—The earnings of the Grand Trunk Railway of Canada for the week ending May 10 were: 1873, £38,200; 1872, £35,300; increase, £2,900, or 8¼ per cent.

—The number of through passengers carried over the Central Pacific Railroad for the year ending April 30, was as follows:

	1872-73.	1871-72.	1870-71.
Eastward	22,782	20,707	24,349
Westward	38,136	28,924	30,599
Total	60,918	49,631	54,948

—The earnings of the Great Western Railway of Canada for the week ending May 16 were: 1873, £25,257; 1872, £23,227; increase, £2,030, or 8¾ per cent.

—The earnings of the Grand Trunk Railway of Canada for the week ending May 17 were: 1873, £42,100; 1872, £33,900; increase, £8,200, or 24 3-16 per cent.

—The gross receipts of the Pacific Mail Steamship Company for the year ending April 30, 1873, were: from passengers, $1,800,710.91; freight, $3,022,194.29; total, $4,822,905.20. This does not include the Central American and California coast lines.

The through freight shipments east over the Central Pacific Railroad for the month of April were 3,838,514 pounds, of which 3,434,672 pounds were from San Francisco and 404,842 pounds from other points. The principal items were: wool, 1,699,337 pounds (379,661 pounds being from Australia); wine, 524,737 pounds; tea, 380,411 pounds; coffee, 258,850 pounds.

—The following is the official report of the earnings and expenses of the Union Pacific Railroad for the month of April:

	1873.	1872.	Increase.	Dec.	Per ct.
Earnings	$881,266 38	$741,802 56	$149,463 82	....	18¾
Expenses (including $91.000 for renewal of rails in 1873)	474,078 64	385,997 74	88,081 10	....	22⅞
Net earnings	$407,187 54	$355,804 82	$51,382 72	....	14¾

For the four months ending April 30, the earnings and expenses were as follows:

	1873.	1872.	Increase.	Dec.	Pr.ct.
Earnings	$2,605,281 32	$2,115.715 17	$489,566 15	....	23⅛
Expenses	1,445,474 56	1,524,762 22	.....	$79,287 66	5¼
Net ear'gs	$1,159,806 76	$590,952 95	$568,853 81	... .	96¼

The earnings per mile for April, 1873, were $854; 1872, $719. For the four months the earnings per mile were: 1873, $2,525; 1872, $2,050; increase, $475, or 23¼ per cent.

PERSONAL.

—A telegram from Mexico reports that General Rosecrans has resigned his position as agent of the Union Contract Company, which purposes the construction of a system of narrow-gauge railroads, leaving General William J. Palmer in charge of the interests of that company in Mexico.

—Mr. Henry J. Barker, well known as a civil engineer and lately Chief Engineer of the Lee & Hudson Railroad, died at his residence in South Adams, Mass., May 29.

—Mr. G. W. Bentley, General Manager; Mr. W. S. Sneden, Superintendent and Engineer; and Mr. O. B. Kinney, General Freight Agent of the New Jersey Southern Railroad, have resigned their respective positions.

—It is reported that Mr. A. B. Stockwell has tendered his resignation of his position as President of the Atlantic & Pacific Railroad Company.

—Mr. A. S. Sweet, for many years head of the locomotive department of the Michigan Central road, died at Detroit, Mich., May 30. Mr. Sweet had filled his position on the road acceptably, and was also esteemed as an honest and upright citizen.

—Mr. W. S. Sneden, who has just resigned his position as Engineer and Superintendent of the New Jersey Southern road, has been connected with the road almost from its first commencement. At one time in connection with other parties, under the firm name of W. S. Sneden & Co., he leased and operated the road (then known as the Raritan & Delaware Bay) for two or three years.

—Mr. John Sheldon, President of the Toronto & Nipissing Railway Company, was killed by being crushed between a car and the depot platform at Carnington Station on the night of the 17th of May.

THE SCRAP HEAP.

Bibles in Passenger Cars.

About the 1st of May the Toledo, Wabash & Western Railway Company began to place Bible racks and Bibles in its coaches. There are four racks in each coach, and upon each in large letters are the words, "Read and return." The Bibles are nicely bound and well printed. Upon one side of each cover is the following inscription: "T. W. & W. R. W. Presented by the Lucas Co. Bible Society;" and upon the other side: "This book is the property of the T. W. & W. R. W. Co., and must not be taken from the coach."

News Agents and Train Boys.

Mr. G. Clinton Gardner, General Superintendent of the Pennsylvania Railroad, has issued a circular to passenger conductors, which says: "It having been alleged that news agents have offered for sale in the cars of this company, without the knowledge of their employers, immoral and obscene publications, passengor conductors are directed to see that such publications are not sold, or offered for sale, on their trains, and to immediately report any attempt to do so to the Division Superintendent.

"Passenger conductors are also instructed that the news agents are subject to their discipline while on their trains. They should see that they are not allowed to offer their commodities in such a manner, or with such frequency, as to discommode or annoy the passengers, and they should not permit any article to be sold which might soil or injure the upholstery or the cars or the clothing of the passengers. The sale of prize portfolios, gifts confections, or similar devices partaking of the nature of lotteries, is forbidden on the cars of this company."

Italian Railroad Engineering.

A subscriber now traveling in Italy writes to us from Florence: "Some of these Italian roads are greater marvels of engineering than the Central Pacific or the Union Pacific. Between Rome and Florence we run through tunnels varying from a few rods to more than a mile in length. One, near the place where Hannibal defeated the Consul Flaminius 2,000 years ago, is more than one mile. Between here and Bologna, a half-day's ride, we pierce the Apennines about 40 times—not the whole width, it is true. The descent is so great that in order to lessen the grade one of the tunnels forms the letter S."

Railroad Manufactures.

The Harrisburg Car Manufacturing Company recently received an additional order from the New York Central & Hudson River for 400 box and 100 platform cars.

The Buffalo Car Works are now filling orders for 200 box cars for the Red Line Transit Company, 200 gondolas for the Buffalo, New York & Philadelphia, and 100 box cars for the New York Central & Hudson River. They have also contracts for oil-tank cars for the Lake Shore & Michigan Southern, platform cars for the Lake Ontario Shore, and box cars for the Cayuga Lake. The works employ nearly 300 men.

The North Chicago Rolling Mill now has a capacity of 36,000 tons of iron rails and 15,000 tons of steel rails annually. About 1,400 men are employed. The buildings of the company comprise two blast furnaces 65x17 each; a complete rail and puddling mill 290x177 feet; a separate rail and blooming mill 250x140 feet; a puddle mill 81x200 feet, and a five-ton Bessemer plant in a convenient building 115x128 feet. These buildings do not include the repair shops, ovens, offices and other structures owned by the company. The Bessemer plant is one of the latest and most complete in the country, costing $300,000. Two converters are in use, which are now running "half time," or twelve heats per day, making 5 3-10 tons of metal at each heat.

Trial of Westinghouse Brake.

A telegram from Philadelphia, dated May 20, says: "The Committee of Science of the Franklin Institute to-day witnessed a series of experiments with the Westinghouse air-brake on a train on the Pennsylvania Railroad. Operated from the engine, the train, going at the rate of thirty miles, was stopped in sixteen seconds, moving 503 feet after the brake was applied. Operated from the center car, the train stopped in fifteen seconds within 515 feet. Acting automatically by severing, the train stopped in twelve seconds within 367 feet. With the train going forty miles an hour, the brake was applied by severing the engine from the train, and stoppage was effected in ten seconds within 315 feet. Various other experiments were made which were altogether successful."

Locomotives for Wooden Railroads.

The Boston *Transcript* thus speaks of an unusual class of locomotive building:

"George E. Fifield, of South Newmarket, N. H., has been building for a few years past a novel class of locomotives for the wooden-track railways in the lumber regions of Georgia. They are only six tons in weight, and have very large cylinders for so light machines. The capacity for carrying water and fuel is very great, the whole forming a very unique and serviceable machine, one of them being able to do the work of 30 mules easily. The rapid denudation of the timber lands along the rivers and lines of railroad all through the South is driving the lumbermen deeper into the forests to supply the demand for a material almost indispensable for heavy bridges, cars and floors throughout the country. No yellow pine tree ever grows where one is cut, a soft, sappy and worthless scrub pine of another kind taking its place."

CHICAGO RAILROAD NEWS.

Depot Reading Room.

The Young Men's Christian Association announces its intention to open a "Depot Reading Room," June 15, in the new passenger depot of the Lake Shore & Michigan Southern and Chicago, Rock Island & Pacific railroads. In a circular the Association says: "This structure is the largest and handsomest depot building in the world. These companies have very generously set apart a large room, 29 x 50 feet, containing 17 windows, lighted by gas and heated by steam, situated immediately over the passenger waiting rooms, which will be fitted up in a neat and attractive manner, and contain a full supply of all the leading papers and magazines. It is proposed to make the place so attractive, by its literature and surroundings, that the railway employees, the traveling public and residents in that vicinity cannot resist the temptation to accept of the free invitation which it will extend to all, and spend their leisure moments in the improvement of the mind."

Chicago & Northwestern.

The contractors on Tunnel No. 3, near Sparta, Wis., on the Madison Extension, got a heading through May 14. Much work yet remains to be done in enlarging the tunnel to the full size, arching, etc. The tunnel is 3,800 feet long. It is thought that trains will hardly run through it before September.

OLD AND NEW ROADS.

Monticello & Port Jervis.

The General Term of the New York Supreme Court has reversed the decision of the lower court which declared illegal and void the bonds issued to this company by the town of Thompson, Sullivan County, N. Y. It is most probable that an appeal will be made from this decision to the Court of Appeals. The amount of the bonds is $148,000.

Hannibal & Central Missouri.

An order has been made by the County Court of Monroe County, Mo., transferring to the Missouri, Kansas & Texas Company $250,000 in stock of the Hannibal & Central Missouri Company held by the county. The Missouri, Kansas & Texas Company is required to enter into bonds to the amount of $230,000 to fulfill the conditions named in its original proposition, and also to agree that in case any connection is made with the Hannibal & St. Joseph anywhere over eight miles west of Hannibal, such connection shall be made at Monroe City.

Hempstead & New York.

It is said that the entire control of the company has been secured by the South Side Railroad Company and that the work will be pushed forward to completion. A section of the road about four miles long, from Hempstead to Valley Stream on the South Side road, has been completed for two or three years and has been operated as a branch of the South Side. Several attempts have been made to complete the road through to Bay Ridge, whence connection is to be made by ferry with New York, but have failed, owing mainly to dissensions in the company and quarrels over the control of the road.

It is said that the recently proposed plan, by which the South Side track was to be used from Valley Stream to Berlin and the Brooklyn Central & Jamaica track from Berlin to East New York, has been abandoned and a separate track will be built from Valley Stream to Bay Ridge, passing through Clarenceville and Woodhaven. The distance is about 17 miles.

Pennsylvania & New York.

The Havana (N. Y.) *Journal* says that surveys are being made for an extension of this line from its present terminus at Waverly, N. Y., on the Erie, northward through Smith Valley and Mecklenburg. It is also stated that the right of way is being purchased for the road.

Little Lehigh & Cedar Creek.

Surveys are being made for a railroad by this name from Allentown, Pa., west to Virginsville, in Berks County, a distance of about 30 miles. Mr. A. H. Mullan is Chief Engineer.

Pennsylvania—New York Division.

A considerable force is at work grading for the additional tracks between Elizabeth and Rahway.

The newspaper train, which was to leave New York 3:30 a. m. for Philadelphia, is not now running, owing to some difficulty with the parties for whom the train was to be run.

Michigan Air Line.

The complaint in the suit in which an injunction was recently granted prohibiting the execution of certain agreements with the Michigan Central Company is a very long document and contains several allegations of fraud against the officers of the company. It is charged that the trust deed to the Farmers' Loan & Trust Company of New York to secure the issue of $1,850,000 in bonds was executed by the President and Secretary without authority from either directors or stockholders. It is also claimed that the lease of the line from Jackson to Niles to the Michigan Central was made fraudulently and without authority. The complainants claim that the trust deed and lease are void unless confirmed and ratified by the board of directors. It is charged also that the Michigan Central Company expended money extravagantly in completing and equipping the road under the lease, and that the gross earnings of the road are greatly in excess of the sums required for paying operating expenses and interest on bonds, as would appear if the Michigan Central were compelled to account for the receipts.

By the preliminary injunction (a copy of which was published May 17) the directors of the Air Line Company are enjoined from ratifying or confirming the said lease and deed of trust or from making any new obligation of the kind; Mr. Joy and the Michigan Central Company are enjoined from disposing of any of the Air Line; and the Farmers' Loan & Trust Company is enjoined from disposing of the deeds of trust.

The Niles (Mich.) *Republican* of May 29 says: "We also

have information, deemed reliable, that the employees on the Michigan Air Line and the Niles & South Bend Railway have had orders to hold themselves in readiness to remove the rolling stock and all moveable property from these two roads at a day's notice, with a view to abandoning them. We give the rumor, which comes to us from a source entitled to credit, for what it is worth."

Concord.

At the recent annual meeting of this company resolutions opposing consolidation with other companies and instructing the directors to make no lease or other contract were offered, but voted down. A resolution authorizing the board to lease the Nashua, Acton & Boston road was indefinitely postponed.

Boston, Hartford & Erie.

A meeting of the directors of the old company was held in New York June 3, at which Mr. Frederic A. Lane resigned his position as President and John Rooney was chosen in his place. The directors also declared their intention of contesting the claim of the new company (the New York & New England) to certain portions of the assets of the company, which, it is claimed, the Berdell mortgage did not cover. Among these assets are the dock property in Boston, the Norwich & Worcester lease and the equity of redemption in the Hartford, Providence & Fishkill road. The directors authorized the President to employ counsel to bring suit against the new company, which now has possession of the assets claimed.

Somerset.

The contract for the grading and masonry of the extension of this road from Norridgewock, Me., to Madison Bridge, has been awarded to S. C. Mills & Co., and work has been commenced.

New Haven, Middletown & Willimantic.

The ballasting is completed and the road is in order as far as East Hampton, Conn., 33 miles from New Haven. On the remaining 20 miles from East Hampton to Willimantic the work of ballasting is progressing.

A party of the officers of the company and of the New York & New England Company recently passed over the road on a tour of inspection. Arrangements for the running of through trains from New York to Boston by this line are being made.

St. Joseph & Denver City.

A meeting of the bond holders of this company is called, to be held at the office of Hessler & Co., No. 7 Wall street, New York, June 11, to consider as to action necessary to protect their interest, the last coupon having been overdue more than 60 days.

Lee & New Haven.

Since the failure of the bill extending the time in which the State subsidy could be secured, all work has been suspended. At a meeting of the company it has been decided to make an assessment on the stockholders sufficient to pay for all the work that has already been done.

Holyoke & Westfield.

The town of Holyoke, Mass., has voted to take $60,000 more stock in this company. The road is leased by the New Haven & Northampton Company.

Pacific, of Missouri.

St. Louis papers of June 1 publish the correspondence between the attorneys of this company and Attorney-General Ewing, of Missouri, in regard to the suit to test the constitutionality of the law under which the State released to the company its interest in the road. The company has decided to withdraw from the agreement with the Attorney-General to make up a case and bring it to trial as soon as possible. It is probable that the Governor will shortly advertise the road for sale under authority of the concurrent resolution passed by the Legislature last winter.

Des Moines Valley.

A dispatch from Des Moines, Ia., dated May 31, says:

"Final decree was rendered to-day in the Polk County Circuit Court ordering the sale of the Des Moines Valley Railway. The road is to be sold under special execution, by the Sheriff of Polk County, and the bonds under the first and second mortgages received on the bid on condition that the purchaser pays in cash an amount necessary to pay the costs and mechanics' liens. The first-mortgage bonds amount to $2,300,000 and interest, and the bonds of the second mortgage about $23,000 and interest.

"The payment of the Illinois & Mississippi Telegraph Company is deferred to the second mortgage, and will probably be left out in the cold."

Consolidation of the Eastern and Boston & Maine Companies.

The Massachusetts Senate has tabled the bill providing for the consolidation of these two companies, and it is thought that no further action will be taken on it this year.

Cairo & Fulton.

Trains commenced running from Little Rock, Ark., to Benton, 24 miles southwest, June 2. The track is laid a short distance beyond, and the work is progressing rapidly.

Union Depot at St. Louis.

The project of building a Union Passenger Depot for all the railroads entering St. Louis has been practically abandoned. It is said that the companies interested will build a temporary depot in East St. Louis, near the Illinois end of the bridge.

Perth Amboy & Long Branch.

The hearing of the argument on the motion for a preliminary injunction to restrain this company from building its bridge across the Raritan River at Perth Amboy commenced in the United States Circuit Court at Pittsburgh, Pa., May 29. This is the company which is building a part of the New Jersey Central's Long Branch line. The Pennsylvania Railroad Company is the complainant.

New York Central & Hudson River.

This company having paid, under protest, the tax on the scrip dividends, the payment of which has been so long contested, has commenced a suit against John M. Bailey, as collector of internal revenue for the fourteenth district of New York, to recover the scrip dividend tax, the penalties thereon, and the amounts received by him from the sales of the company's property, amounting in the aggregate to $555,173.60. The papers were filed May 24.

St. Joseph Bridge.

The bridge over the Missouri River at St. Joseph was formally opened for travel May 31, by a public celebration, which included a procession, several addresses and a banquet to a large number of invited guests.

A dispatch from St. Joseph says that it is expected that in a few days arrangements will be completed for the trains of the Missouri Pacific, the Atchison, Topeka & Santa Fe, the Atchison & Nebraska, the Leavenworth, Lawrence & Galveston roads to run over this bridge.

Chicago & Southwestern.

The Leavenworth (Kan.) *Times*, of May 30, says: "It gives us unqualified pleasure to announce that freight cars for Leavenworth from the Burlington & Missouri River, North Missouri and Kansas City, St. Joseph & Council Bluffs railroads are now taken from Beverly and Plattsburg by the Chicago, Rock Island & Pacific trains over the Leavenworth bridge to the depot at the head of Sixth street. Hitherto the freight transfers were made by these roads at Kansas City and Atchison, and cars brought to this city by the Missouri Pacific trains.

"The North Missouri Company now receive St. Louis freights in this city.

"Before many weeks we shall be able to announce that passenger trains of the above roads arrive in and depart from the Union depot of Leavenworth."

Chicago & Paducah.

The track has been laid from Fairbury, Ill., southward eight miles.

Dividends.

The Northern Railroad of New Hampshire pays a semi-annual dividend of 4 per cent. June 1.

The dividend due on the Vermont & Canada Railroad stock June 1 will not be paid, nor will the interest on Vermont Central first-mortgage bonds due at the same time.

Railroad Legislation in Illinois.

Among the laws passed at the recent session of the Illinois Legislature were the following:

Act to compel the trustees of the lands granted to the Illinois Central Railway Company to execute their trust.

Act to amend an act entitled "An act to regulate public warehouses and the warehousing and inspection of grain, and to give effect to article thirteen of the Constitution of the State," approved April 25, 1871, in force July 1, 1871, and to establish a committee of appeal, and prescribe their duties.

Act to dispose of all old internal improvement lands or lots belonging to the State.

Act to amend an act entitled "An act to provide for the incorporation of associations that may be organized for the purpose of constructing railways, maintaining and operating the same, for prescribing and defining the duties and limiting the powers of such corporations, when so organized," approved March 1, 1872.

Act to prevent extortion and unjust discrimination in the rates charged for the transportation of passengers and freights on railways in this State, and to repeal an act entitled "An act to prevent unjust discriminations and extortions in the rates to be charged by the different railways in this State for the transportation of freights on said roads," approved April 7, A. D. 1871.

Act to repeal an act entitled "An act in relation to a portion of the submerged lands and Lake Park grounds, lying on and adjacent to the shore of Lake Michigan, on the eastern frontage of the city of Chicago," in force April 16, 1869.

Chicago & Pacific.

In the suit of this company against the Chicago & Northwestern for the condemnation by the former of a portion of the right of way of the latter company in the city of Elgin, the jury rendered a verdict of $10,000 damages in favor of the Chicago & Northwestern.

The case excited much interest, being the first case ever tried in the State for the condemnation of lands belonging to one railroad company for the use of another.

Regulating Rates in Delaware.

The following is the text of the law regulating rates passed by the late Legislature of Delaware:

"SECTION 4. That if the said Philadelphia, Wilmington & Baltimore Railroad Company, or any other railroad company in this State shall, either as the operator of its own railroad or railroads, or as lessee of other railroads within the State, charge and receive a greater rate per mile for the carriage of passengers (except so far as the same may be increased to the amount of the tax annually paid under the provisions of chapter 458, volume 12, of the Laws of Delaware), or for the carriage or transportation of goods, wares or merchandise, or other property whatsoever, from place to place within the State, or from a place within the State to a place without the State, than is charged by such company for the carriage of passengers and the transportation of property or freight for like distances, or per mile, from places without the State to places within the State, or from places without the State through the State to other places without the State, the person or persons paying such charges, either as fare or freight, shall be entitled to recover from such company so charging and receiving the same a sum tenfold the amount of the money so paid, to be recovered in an action of debt or assumpsit as like amounts are now recovered by law."

The law was one section of a bill to regulate the taxes to be paid by railroad companies.

Pensacola & Louisville.

The Tallahassee (Fla.) *Sentinel* of May 31 says:

"Judge Bradley, of the United States Supreme Court, sitting in Circuit at Mobile, has within a few days past rendered a decision of great importance to this company. It virtually gives them absolute title to the road confirming their purchase under the foreclosure sale, and directing a return of the purchase money under the bankrupt sale, amounting to $55,000 to the Pensacola & Louisville Company. This decision will probably close up all litigation as to title or ownership, in connection with this road."

Jacksonville, Pensacola & Mobile.

An injunction was recently obtained by the Jackson & Sharpe Manufacturing Company, of Wilmington, Del., restraining this company from using certain passenger coaches which had been purchased, but not paid for. The matter was subsequently compromised.

New York & Oswego Midland.

It is stated that the whole of the $4,000,000 which was to be raised for this company has not yet been subscribed, but that the deficiency will be made up when the new programme goes into effect. Nothing definite has yet been made public as to changes in the management.

Meetings.

The Erie Railway Company will choose directors July 8. Transfer books will be closed June 7 and reopened July 9.

Contracts.

J. H. Simpson, Colonel of Engineers, U. S. A., will receive proposals at No. 1122 Pine street, St. Louis, until noon of June 26, for furnishing and delivering the material and doing all the work required for the improvement of the Mississippi River, between the Missouri & Ohio rivers, for which an appropriation has been made by Congress.

F. U. Farquhar, Major of Engineers, U. S. A., will receive proposals at his office in St. Paul, Minn., until noon of June 22, for furnishing the materials and doing the work necessary for the repairs of the piers at the Duluth Canal.

Delaware, Lackawanna & Western—Morris & Essex Division.

The passenger depot at Hoboken, N. J., took fire about 5 o'clock on the morning of May 31, and was entirely destroyed. The city fire department, aided by the company's men, succeeded in saving the freight house, general offices and ferry house, all of which were close to the passenger house, the ferry house, however, being slightly damaged. The books and papers from the ticket offices were saved, but four freight cars on an adjoining switch were destroyed. A large part of the building was on piles over the water, and many of the piles were so burned that they will have to be replaced. The depot was built about five years ago and was of wood, 250 by 75 feet. The loss is estimated at $65,000, which is covered by a floating policy of insurance. Some inconvenience was caused by the fire, but there was no delay of trains.

The last remaining Loughridge steam-brake on this road was lately removed and the train fitted with a Westingnouse air-brake.

Mahoning & State Line.

This company, which filed its certificate of incorporation with the Secretary of State of Ohio May 23, purposes to build a railroad from the Pennsylvania State line northwest through Youngstown to Niles, O., a distance of about 18 miles. The capital stock is to be $600,000, and the corporators are Chauncey H. Andrews, Richard Brown, A. B. Cornell, W. C. Andrews and Robert McCurdy.

College Hill.

This company, which purposes to build a railroad from Cincinnati northwest to Venice, in Butler County, a distance of about 18 miles, filed its certificate of incorporation with the Secretary of State of Ohio recently. The capital stock is to be $100,000.

Toledo, Ann Arbor & Northern.

The officers of this company have lately been inspecting the line from Ann Arbor, Mich., to Toledo, O., the grading on which is now nearly completed. Several gangs of men are at work preparing the road-bed for the iron.

Buffalo & Jamestown.

The work on this road is being pushed forward in the hope of having it completed to Kennedy, on the Atlantic & Great Western and about 56 miles from Buffalo, this season.

Fort Worth & Denver City.

This company asks the Texas Legislature for a charter for a railroad from Fort Worth, Tex., northwest to Denver, Col. At Fort Worth connection is to be made with the Texas & Pacific and projected lines from that point to Sabine Pass and Galveston.

Walkill Valley.

It is said that this road is to have its gauge changed from 6 feet to 4 feet 8½ inches. The only connection with New York is over the Erie. The road extends from Goshen, N. Y., north to Kingston.

Syracuse & Chenango Valley.

In order to secure the completion of this road, a company has been formed to purchase the road, and it is proposed that the creditors of the present company receive stock of the new company in payment of their claims. The corporators of the new company are George F. Comstock, John W. Barker, Hiram Eaton, Clark Snook, Henry Ten Eyck, Samuel D. Luce, E. C. Litchfield, Asel L. Dolby, D. J. Mitchell, R. W. Stroud, Joseph I. Bradley, Horace K. White, Archibald L. Sims. Some of the creditors have lately attempted to put the company into bankruptcy.

Derby Railroad.

The arbitrators in the case of this company *vs.* the New York & New Haven Railroad Company, to decide what sum should be given by the latter to the former for land taken for the site of the proposed new depot in New Haven, decided May 29 that the Derby road should receive the sum of $112,500.

Atlantic & Lake Erie.

Efforts are being made to have the location of the road changed, so as to bring it through Galion, O. The line, as now located, passes about five miles south of that town.

Washington & Ohio.

The road-bed is graded from the present terminus at Hamilton, Va., west to Purcellville, four miles, and work is going on between Purcellville and Round Hill.

Southern Pacific, of California.

Work on the extension south from Tipton, Cal., is progressing. Construction trains run to Deer Creek, and the bridge over that stream is finished.

Baltimore & Potomac.

The mason work of the tunnel under the city of Baltimore is completed, and as soon as the track laying and ballasting can be finished, the tunnel will be opened to travel. This completes the connection between the Baltimore & Potomac and the Northern Central roads. The tunnel is 7,480 feet long, and the contractor, Mr. Thomas Rutter, commenced work on it August 27, 1871.

Ashtabula, Youngstown & Pittsburgh.

Since the decision of the Supreme Court of Ohio annulling the charter of the Pennsylvania & Ohio Canal Company, a lively contest has commenced for the possession of a portion of the canal near Youngstown, O. A correspondent of the Cleveland (O.) *Herald* says: "It is claimed that the canal company obtained merely the right of way; that the fee simple of the land remained in the owner subject to this right of way, and, the company being extinct, the right of way has ceased and the former proprietors of the land can take possession and enjoy it as they do their other property. This they are doing. The Ashtabula, Youngstown & Pittsburgh Railroad Company has purchased of the proprietors of the fee, strips of the canal along at intervals, and by way of appropriating it to said road purposes has laid down ties on the tow path and spiked rails thereon. Other companies have sent gangs of surveyors to peg down the tow path and heel path and mud bed. The Youngstown, Newton Falls & Ravenna Railroad Company has commenced proceedings in the Probate Court to appropriate it legally, and the Atlantic & Great Western Railroad Company, by virtue of its being a large stockholder in the late canal company, claims that it has rights in the land recently occupied by the canal company, which somebody is bound to respect."

Later dispatches state that the Ashtabula, Youngstown & Pittsburgh track was torn up by the opposing parties, and that the Painesville & Youngstown Company was laying track on the tow path.

Pennsylvania & Ohio Canal.

In the case of the State of Ohio against this company, the proceedings being in the nature of a *quo warranto* the Supreme Court of Ohio has decided that the corporation has been guilty of such negligence as is made by the terms of its charter a cause for the forfeiture of its franchises. A judgment of ouster and dissolution is therefore ordered, and trustees will be appointed to close up the affairs of the corporation.

Bangor & Calais Shore Line.

Surveys for this line are in progress between Calais, Me., and Ellsworth. Since the refusal of the city of Bangor to extend aid to the road, it is proposed to make the western terminus at Castine, near the mouth of the Penobscot River. From Castine steamers can be run to Portland, or communication can be established by steamer with Rockland, the terminus of the Knox & Lincoln road.

Springfield & Illinois Southeastern.

A dispatch from Springfield, Ill., states that this company has been endeavoring to secure means for an extension of the road from Beardstown, Ill., northwest to Burlington, Ia., but that the parties who were expected to furnish the money have

declined to do so on account of the passage of the new Illinois railroad law and its probable effect upon railroad interests.

Bangor & Bucksport.

The masonry of the road is nearly completed and much of the grading is done.

The city of Bangor was to vote June 5 on the question of taking $50,000 stock in this road. The money, if it is voted, is to be used to build a bridge across the Penobscot.

Schenectady & Susquehanna.

This road is to be sold at auction, under foreclosure of the second mortgage bonds, in Schenectady, N. Y., July 10. The road is about 15 miles long, from Schenectady to Quaker Street on the Albany & Susquehanna road.

Texas & Pacific.

A correspondent informs us that on the 25th ult. the track was laid for 35 miles west of Longview, Texas, and 25 miles beyond the last point noted. Track was also laid from Dallas east as far as Terrell in Kaufman County, 35 miles from Dallas. Tracklaying has also been commenced on the Transcontinental Division from Sherman eastward.

Work on the grading has been commenced at both ends of the gap between Fulton, Ark., and Texarcana. The distance between the two places is 25 miles.

Houston & Texas Central.

Much complaint is made by Texas papers of the high rate of freight charged by this company, and the Galveston *News* states that considerable shipments of cotton have been made from Denison to New Orleans by way of the Missouri, Kansas & Texas to St. Louis and thence by river.

Mississippi Valley & Western.

The road from Clarksville, Mo., to Dardenne is all graded, and it is stated that a quantity of iron for the road is on the way up the river from New Orleans.

Kalamazoo, Lowell & Northern Michigan.

The stockholders of this company and the Michigan Northern Railroad Company are to hold a joint meeting in Grand Rapids, Mich., July 17, for the purpose of voting on a proposed consolidation of the two companies.

Rockport & Laredo.

This company completed its organization in Galveston, Tex., May 27. The road is to extend from Rockport, Tex., on Aransas Bay, west to Laredo, on the Rio Grande, a distance of 130 miles. The company has also a right to build a branch from Laredo to San Antonio, about 80 miles. The company has a land grant of 16 sections per mile from the State.

Dunkirk, Allegheny Valley & Pittsburgh.

The question of right of way for this road into the city of Titusville, Pa., has been settled and work is to be commenced at once on the freight and passenger depots.

Pennsylvania & Delaware.

A tract of 150 acres with a water front of 1,000 feet has been purchased at Delaware City, Del., and the construction of coal docks is to be commenced at once. The ballasting of the northern end of the road is going on and it will soon be ready for opening.

Quincy, Alton & St. Louis.

It is reported that work will shortly be commenced on the extension of this road from Rockport, Ill., southeast through Hardin and Grafton to Alton.

Quincy, Havana, Atlanta & Northeastern.

This newly organized company purposes to build a railroad from Quincy, Ill., northeast through Havana and Atlanta to the Indiana line. The capital stock is to be $2,000,000.

Milwaukee & St. Paul.

La Crosse (Wis.) papers say that the United States District Attorney has received instructions to commence suit to compel the company to remove the obstructions placed in the Mississippi River at the head of Minnesota Island, two miles above La Crosse. These obstructions were placed there by the company preparatory to the building of a bridge at that point, and consist, we believe, mainly of pile work, though it is asserted that a large quantity of stone was dumped in the river.

Northwestern Union.

The track is laid from Fond du Lac southward to Kewaskum, Wis., a distance of about 20 miles, making 16½ miles of new track since our last accounts.

Detroit & Bay City.

The contract for the bridge over the Saginaw River at Bay City, Mich., has been let to the American Bridge Company, of Chicago. The bridge will be a Howe truss of wood and 1,468 feet long. The contract for the pile work has been let to Walter Fitzgerald.

Northern Central, of Michigan.

It is stated that this road is to be extended from Lansing, Mich., north to St. Johns, on the Detroit & Milwaukee, a distance of about 20 miles.

Richmond & Chesapeake.

Virginia papers report that this road is to be extended from West Point to some point on Chesapeake Bay, probably Gloucester Point.

New York & Chicago.

This company, recently organized in Illinois, purposes to make a new line from New York to Chicago, using several roads already built as portions of the line. The capital stock is to be $2,500,000, and the corporators are James E. Abbot, William C. Kebbe, Edward Cowles, New York; R. E. Wiggins, John H. Gutches, Chicago.

Northern Pacific—Pacific Division.

On the extension northward the line is cleared to the Nisqually River, and a large part of the grading is done. The Kalama (W. T.) *Beacon* reports that the contractors have received instructions to build 100 miles of the extension, instead of 40, as by the first contract.

Milwaukee & Northern.

The track is laid to Depere, Wis., 17½ miles north of the late terminus at Forest Junction, and within about four miles of Green Bay. It is expected that the track will reach Green Bay in a few days.

New Law Regulating the Carrying of Live Stock.

One of the latest laws passed at the late session of Congress is entitled "An act to prevent cruelty to animals while in transit by railroad or other means of transportation within the United States." Approved March 3, 1873. Section 1 declares that "No railroad company, whose road forms any part of a line of road over which animals shall be conveyed from one State to another, shall confine them for a longer period than twenty-eight consecutive hours, without unloading for rest, water and feeding, for a period of at least five consecutive hours, unless prevented from so unloading by storm or other accidental causes. In estimating such confinement the time during which the animals have been confined without such rest on connecting road shall be included. Animals so unloaded shall be properly fed and watered during such rest by the owner or person having the custody thereof, or in case of his default in so doing, then by the railroad company or owners or master of boats or vessels transporting them, and they shall have a lien upon such animals for food, care and custody furnished. A penalty of not less than one hundred nor more than five hundred dollars is imposed. Where animals are carried in cars or vessels in which they have proper food, water, space and opportunity for rest, they need not be unloaded. Penalties and liens are to be enforced in the United States District and Circuit Courts.

LOCOMOTIVE RETURNS, FEBRUARY, 1873.

Master Mechanics of all American railroads are invited to send us their monthly reports for this table.

Name of Road.	Number of miles operated	Number of Locomotives in service	Mileage. Passenger	Freight	Miscellaneous	Total	No. of Miles run to Ton of Coal	Cord of Wood	Pint of Oil	Cost per Mile, in Cents. Repairs	Fuel	Stores	Miscellaneous	Engineers, firemen and wipers	Total	Average Cost of Coal, per ton	Wood, per cord	Oil, per gallon
																$	$	$
California Pacific	148	10	13,100	5,270	3,110	21,480	.....	44.63	17.80	5.53	11.20	0.84	....	6.00	23.57	.....	5.00	....
Central Pacific (Western Division)	173.4	42	34,396	38,947	25,475	98,818	47.06	.....	13.16	13.85	17.90	0.99	....	6.71	39.53	8.49	5.00	....
" " (Sacramento Div.)	119.5	36	12,450	32,305	23,225	67,980	.....	30.44	15.55	10.69	13.14	0.85	....	6.90	32.08	.....	4.00	....
" " (Truckee Div.)	204.5	27	11,480	36,825	10,150	58,455	33.32	42.95	13.28	12.88	22.00	1.03	....	7.97	43.88	8.49	4.00	....
" " (Humboldt Div.)	236.6	24	13,471	36,541	5,550	55,562	34.51	.....	11.72	11.55	24.96	1.05	....	6.87	44.43	8.49	9.00	....
" " (Salt Lake Div.)	182.8	24	11,759	42,749	5,300	59,808	33.84	.....	10.69	15.30	25.48	1.08	....	7.48	49.31	8.49	9.00	....
" " (Oregon Div.)	151.43	9	10,620	7,035	2,400	20,055	.....	42.13	18.76	12.08	11.86	0.69	....	6.64	31.27	.....	5.00	....
" " (Visalia Div.)	146.3	8	8,160	5,750	2,710	16,630	65.36	.....	18.14	7.41	12.94	0.72	....	7.00	28.07	8.49	5.00	....
Chicago & N. W. (Wis. & Mil. Div.)	.....	85	57,320	108,813	44,576	201,709	25.60	.....	.....	11.70	16.10	0.84	....	8.68	37.32	3.50	4.75	....
" " (Madison Div.)	.....	14	9,612	20,503	6,467	36,582	29.74	.....	.....	4.05	14.33	0.99	....	7.39	26.73	3.50	4.75	....
" " (Galena Div.)	.....	68	29,346	76,947	45,104	151,397	28.21	.....	.....	16.44	12.83	1.17	....	9.87	40.31	3.50	4.75	....
" " (Iowa Div.)	.....	70	51,422	65,144	31,304	147,870	29.05	.....	.....	7.37	12.35	1.33	....	8.98	32.03	3.50	4.75	....
" " (Peninsular Div.)	.....	25	2,755	14,327	34,435	51,517	37.86	.....	.....	7.86	12.56	0.63	....	7.62	28.67	3.50	4.75	....
Chicago, Rk. Isl. & Pacific (Ill. Div.)	.....	83	40,202	151,639	4,197	196,021	34.85	.....	14.94	4.32	8.70	0.53	....	6.94	20.54	3.00	3.50	....
" " " " (Iowa Div.)	.....	105	60,098	145,139	21,189	226,426	34.46	.....	12.59	6.41	8.80	0.66	....	7.13	23.00	3.00	3.50	....
Cleve., Col., Cin. & Ind. (Ind. Div.)	207	59	23,519	136,562	26,450	186,531	41.31	.....	20.47	4.58	7.26	0.59	....	8.04	20.47	3.00	....	....
" " " (Col. Div.)	138	52	22,240	81,563	43,825	148,628	40.81	.....	21.39	3.29	7.35	0.62	....	7.00	18.26	3.00	....	....
" " " (Cin. Div.)	130	26	19 040	24,439	19,177	62,656	44.15	.....	18.47	4.25	6.79	0.61	....	9.93	21.58	3.00	....	....
Cleveland & Pittsburgh	.....	82	.....	.....	.....	196,423	54.14	.....	18.90	4.34	5.79	0.65	....	7.04	17.82	2.60	1.95	....
Denver Pacific	.....	....	5,048	4,998	2,800	13,848	45.28	.....	17.57	0.95	6.73	0.46	....	7.13	15.32	3.25	2.57	....
Hannibal & St. Joseph	.....	59	32,076	68,337	20,220	120,653	42.50	.....	19.40	10.36	6.50	0.90	....	7.50	25.20	2.50	5.00	....
Illinois Central (Chicago Division)	252.5	69	42,633	83,919	36,124	168,676	31.62	.....	10.90	11.09	6.34	0.76	....	7.28	25.47	1.90	3.70	0.50
" " (South Division)	230.75	33	24,023	62,948	15,541	102,512	29.54	.....	10.41	7.60	6.75	0.80	....	6.70	21.85	1.90	3.70	0.50
" " (North Division)	225	45	26,612	91,069	14,140	131,821	27.75	.....	11.54	7.98	7.13	0.72	....	6.46	22.29	1.90	3.70	0.50
" " (Iowa Division)	401	36	26.759	58,184	10,272	95,215	32.47	.....	66.03	9.56	7.33	0.57	....	6.63	24.09	2.25	7.50	0.50
Kansas Pacific	672	....	54,154	54,833	39,877	148,854	37.70	.....	14.35	6.59	10.09	0.56	....	7.26	24.50	3.75	3.68	....
Lackawanna & Bloomsburg	80	24	11,045	24,695	16,320	52,860	.....	.....	0.74	5.87	.....	.....	....	7.03	13.64	.....	.....	....
Lake Sh. & Mich. Sou. (Buffalo Div.)*	.....	83	23,936	135,732	65,515	225,183	49.26	.....	11.72	5.60	7.10	.....	....	6.15	18.85	3.50	3.50	....
" " " " (Erie Div.)*	.....	93	34,332	166,046	53,115	253,493	44.54	45.88	14.47	5.47	7.90	.....	....	7.27	20.64	3.50	4.00	....
" " " " (Toledo Div.)*	.....	74	37,724	130,241	27,344	195,489	38.92	50.24	13.05	4.82	9.56	.....	....	7.63	22.01	4.00	4.00	....
" " " " (Mi.So. Div.)*	177	119,191	741,270	182,954	543,415	35.43	44.74	20.06	4.39	9.16	.....	....	6.60	20.77	4.50	3.50	....
Leavenworth, Lawrence & Galveston	206.6	14	15,593	16,185	2,898	34,676	60.30	.....	28.42	3.08	6.92	0.51	....	7.24	17.75	4.00	2.00	....
Marquette, Houghton & Ontonagon†	.....	12	4,890	3,355	14,790	23,075	87.97	.....	22.01	21.71	9.69	0.98	....	9.54	41.92	.....	.....	....
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Pennsylvania (New York Division)	119.9	105	131,640	113,710	10,530	255,880	32.23	47.39	7.68	9.50	17.40	1.60	....	.....	28.50	0.20	6.56	....
" (Amboy Division)	134.2	58	47,067	53,075	5,176	105,338	43.84	51.28	10.55	16.80	13.10	1.20	....	.....	31.10	0.20	6.56	....
" (Belvidere Division)	84.6	31	18,732	29,378	6,138	54,308	34.77	43.29	9.23	7.30	16.60	1.40	....	.....	25.30	0 20	6.56	....
" (Philadelphia Div.)	165.3	133	66,341	262,885	9,467	339,193	30.18	.....	16.23	4.60	7.10	0.90	....	.....	12.60	0.07	3.76	....
" (Middle Division)	131.6	117	55,863	259,550	10,655	326,068	25.80	....	18.05	5.60	8.10	0.30	....	.....	14.50	0.07	3.76	....
" (Pittsb'g Div., E. End.)	.....	84	7,437	139,903	2,602	149,942	21.31	.....	10.18	6.80	9.70	1.20	....	.....	17.30	0.07	3.76	....
" (Pittsb'g Div., W. End.)	.....	110	64,567	169,117	6,587	240,271	33.63	.....	14.29	7.30	6.30	0.90	....	.....	14.50	0.07	3.76	....
" (Tyrone Division)	100.3	26	9,935	25,164	2,323	37,422	30.14	.....	24.39	15.00	6.90	0.80	....	.....	22.70	0.07	3.77	....
" (West Penn'a Div.)	103.6	27	15,174	39,964	2,941	58,079	33.40	.....	24.61	5.00	6.30	0.50	....	.....	11.80	0.07	3.77	....
" (Lewistown Division)	625	13	6.715	14,333	536	21,584	32.33	.....	14.41	15.10	6.50	1.10	....	.....	22.7	0.07	3.76	....
" (Bedford Division)	45	8	4,128	5,623	1,314	11,065	50.49	.....	15.38	3.20	4.20	0.80	....	.....	8.20	0.07	3.79	....
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Pittsb., Ft. Wayne & Chic. (E. Div.)	319.2	153	72,360	295,299	9,323	376,382	33.82	.....	11.53	4.83	8.15	1.05	1.20	7.19	22.42	.....	.....	....
" " " (W. Div.)	280	106	72,720	200,193	16,074	233,983	39.60	22.80	14.69	6.30	12.39	0.70	....	7.00	26.30	3.90	3.25	....
Pitts., Cin. & St. L. (Lit. Miami Div.)	.....	41	45,814	41,832	3,086	90,732	42.10	.....	10.40	6.40	8.30	1.00	3.50	7.90	27.10	2.50	3.30	....
San Francisco & North Pacific	38	3	3,700	3,610	.....	7,310	.....	40.16	19.29	3.96	12.45	0.67	....	5.02	22.10	.....	5.00	....
South Carolina	.....	37	13,977	53,054	12,720	79,751	.....	39.32	29.44	5.51	6.36	0.75	....	.....	12.62	.....	2.00	....
Allegheny Valley	.....	47	40,574	85,713	1,240	127,527	41.10	.....	22.50	7.04	5.38	0.89	....	8.43	21.73	2.00	2.70	....

* Switching Engines allowed six miles per hour. † 0.93 lbs. sand used per mile run.

Peachbottom.

The grading for about ten miles from Oxford, Pa., west to the Conowingo Creek is nearly finished, and the company hopes to commence tracklaying next month. The company is about to issue first-mortgage bonds to the amount of $12,000 per mile.

North Pacific Coast.

The courts have refused to grant the injunction which was asked for to prohibit the Supervisors of Marin County, Cal., from issuing the $60,000 of bonds which was voted to the road.

Union Pacific.

Mr. Horace F. Clark, President of the company, has ordered that the plans for the depot and general offices at Omaha shall be completed at once, as the question as to their location has been finally determined. This is supposed (in Omaha) to settle the long-pending question between Omaha and Council Bluffs.

Great Western of Canada.

This company has announced that the increase of capital authorized to the extent of £1,216,618, will be made by an issue of 5 per cent. perpetual debenture stock at 90, at which price it will yield to investors £5 11s. per cent. The installments extend to the 1st of February, 1874. The allotment will be made ratably to the holders of ordinary shares.

The Richmond Switch Accident.

The Rhode Island Railroad Commissioner, who investigated the circumstances of the accident at Richmond Switch, reported to the Legislature, May 28, that the bridge proved to have been properly built, and to have been recently examined; that the accident was not caused by any defect of material or mismanagement of the railroad company, but was caused by a break in a dam over which they had no control, said dam being, in the judgment of competent authority, thoroughly built. The Commissioner recommends a law requiring each passenger car to be provided with fire-extinguishers, axes and pails, with increased protection for stoves.

Southern Minnesota.

Notice has been served on a number of homestead claimants in Freeborn County, Minn., to appear at the United States Land Office in Jackson and prove their title to their land, the company claiming it under its land grant. Most of the parties have held their land for several years.

Green Bay & Lake Pepin.

The road has been located down the valley of the Trempealeau for some 18 miles west of the present terminus at Merrilan, Wis., and work on the grading has commenced. The western terminus is not yet decided on.

The Hoosac Tunnel Route.

The lower house of the Massachusetts Legislature has passed the bill providing for State management by a vote of 110 to 108, and it went to the Senate, where it was referred to the Treasury Committee.

The Japan Railroad.

Japan's one railroad, which is 18 miles long, makes weekly reports of earnings, which for the week ending March 9 were $7,671, all but $341 being from passengers. This is an average of $426 per week, and with American or European rates would indicate an enormous traffic. The total number of passengers is reported to have been 24,706, or about 3,500 per day.

Lawrence.

Articles of consolidation of the Lawrence and the Youngstown & Canfield railroad companies have been filed with the Secretary of State of Ohio. The Lawrence road is leased to the Pittsburgh, Fort Wayne & Chicago and sub-leased to the Pennsylvania Company.

New York, Boston & Montreal.

The Troy (N. Y.) *Press* says: "It is said that under the new consolidation affecting the Harlem Extension Railroad, it is proposed to build the connecting link of railroad from the State Line down the Walloomsac valley to Hoosick Falls, and use the Troy & Boston track from there to Petersburgh Junction, and abandon the corkscrew track from Petersburgh Junction to Bennington. The road from Bennington to North Bennington will then be leased to the Glastenbury Railroad."

This arrangement, if made, would leave Bennington on a branch, instead of the main line.

Columbus & Toledo.

About $640,000 has been voted in aid of this road under the Boesel law, which subscriptions are illegal under the recent decision of the Ohio Supreme Court. An effort is being made to make up the amount by private subscriptions.

Indianapolis, Bloomington & Western.

A contract for the construction of the bridge over the Illinois River at Havana, on the Western Extension, has been let to A. Walbaum, of Chicago. The route west of the river has not been finally decided on.

Mankato & Wells.

The township of Mankato, Minn., has refused to vote aid to this road. This does not affect the aid already voted by the city of Mankato.

Ware River.

The price ($375,000) paid for this road at the recent trustees' sale will be sufficient to pay the bondholders about 50 per cent. of the face of their claims. Under a recent act of the Massachusetts Legislature, they have the option of taking their pay in this manner or of converting their bonds into stock in a new company. A meeting of the bondholders is to be held, June 12, for the purpose of organizing a new company to operate and complete the road. For the present, the Boston & Albany Company will operate it under a temporary arrangement.

Boston & Albany.

The bridge over the northwest branch of Westfield River, near Chester, Mass., was burned May 27, causing some delay to travel. The fire is supposed to have been caused by the falling from a car of some straw, which had been ignited by sparks from the locomotive.

Cazenovia, Canastota & De Ruyter.

The directors of the Cazenovia & Canastota and Cazenovia & De Ruyter companies have agreed on a consolidation of the two companies under the above title. The agreement has yet to be voted on by the stockholders. The consolidated line will extend from Canastota, N. Y. (on the New York Central & Hudson River road, 127 miles west of Albany), southward through Cazenovia to De Ruyter, 28 miles.

Lehigh & Susquehanna.

Pennsylvania exchanges report that surveys are being made for an extension or branch of this road from Mauch Chunk, Pa., through Tamaqua to Harrisburg, a distance of about 80 miles. The construction of such a line would give the New Jersey Central a line of its own to Harrisburg, which, however, would be some 20 miles longer than the present line through Allentown and Reading.

International & Great Northern.

The track on the Great Northern Division is laid to the Sabine River, about seven miles beyond Lyndale, the late terminus, and 22 miles beyond Tyler. A new town named Minneola has been laid out at the crossing of the Texas & Pacific, about three miles north of the Sabine River, and will be the terminus of the road for a time.

Pittsburgh, Virginia & Charleston.

Contracts have been let for the grading from Monongahela City, Pa., southward to Brownville, a distance of about 22 miles.